Evaluation of Geology and Water Well Data Associated with the EPA Hydraulic Fracturing Retrospective Case Study Bradford County, Pennsylvania

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EXECUTIVE SUMMARY

The EPA is conducting a retrospective study regarding the relationship, if any, between hydraulic fracturing and drinking water resources as described in EPA's "Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources" dated November 2011 (EPA Study). The scope of this report includes the evaluation of analytical data collected by Chesapeake Energy contractors and analyzed by commercial laboratories from 14 water wells and 1 spring (EPA Study Wells) that were included in EPA's October and November 2011 Bradford County, Pennsylvania sampling events and were located within the vicinity of Chesapeake Energy's operating area. These 14 water wells and 1 spring are not inclusive of all EPA sample locations (37 total) but were limited to the sample locations at which Chesapeake Energy was permitted to collect split samples with the EPA in Bradford County. Chesapeake Energy requested that an evaluation be completed of the sample results for the Chesapeake Energy contractor-sampled locations by Weston Solutions, Inc. (WESTON®).

EPA Study Well water quality data provided by Chesapeake Energy were assessed to meet the following objectives:

- To determine whether any of the parameters of interest had experienced significant changes following Chesapeake Energy baseline sampling;
- To compare EPA Study Well water quality with historic water-quality data obtained prior to the commencement of Marcellus Shale activities in Bradford County, PA (approximately 2007);
- To identify any EPA Study Well exceedances of various screening criteria derived from EPA MCLs and SMCLs, PADEP Act 2 Land Recycling Program, and EPA Regional Screening Levels and contrast these EPA Study Well exceedances with historic water well exceedances; and
- To provide general observations regarding the EPA Study Well water-quality data contrasted with historic water quality in Bradford County, and Chesapeake Energy's baseline data for nearby water wells.

Time series plots for each of the wells have been prepared for the following water-quality parameters: total barium, chloride, total iron, total manganese, dissolved methane, sodium, and TDS. Chloride, total barium, sodium, TDS, and methane were chosen as key indicator parameters that could indicate the presence of constituents from natural gas drilling or

production operations. Total iron and total manganese were selected because they are commonly found in northeastern Pennsylvania groundwater at naturally-occurring levels that commonly exceed their respective water-quality screening criteria (e.g. EPA SMCL or PADEP Act 2).

Two publically available USGS groundwater data sets - NWIS and NURE - were used to conduct a statistical analysis of historical pre-natural gas development groundwater quality in Bradford County, Pennsylvania between 1935 and 2007. The two groundwater data sets are both maintained by the USGS. In addition, data from a USGS and PGS report (William et al. 1998) and Chesapeake Energy's Baseline Sampling Program for samples located in the vicinity of the EPA Study Wells under consideration were used to further develop the descriptive statistical summaries for the EPA Study Well area.

The descriptive statistical summaries for these data sets were compared to screening criteria developed from the PADEP Act 2 Land Recycling Program, EPA MCLs and SMCLs, and EPA Regional Screening Levels for Tap Water (Chronic). Many of the parameters in these historical or background data sets (such as total manganese, total arsenic, chloride, total lead, total lithium, TDS, total aluminum, and total iron) exceed the screening criteria. The EPA Study Well analytical results were summarized and compared to these same screening criteria. As would be expected based on historic water quality in the region, these data demonstrate that many of the water samples collected from the EPA Study Wells exceed the screening criteria for both baseline and subsequent analyses for these same parameters.

Durov and Piper diagrams were generated for each of the EPA Study Wells and the two primary aquifer formations (Catskill and Lock Haven) to graphically illustrate the chemical distribution of major cations and anions for baseline and subsequent sampling timeframes and to verify the formations that these wells were completed within. Formation-specific mean and median values of constituent concentrations were calculated from the historic water well quality databases (e.g., NURE, NWIS, Williams et al.) and were plotted on the Catskill and Lock Haven diagrams for comparison purposes. The plots show that the EPA Study Well water quality is relatively consistent over time, and that there is no significant deviation in water quality from baseline to post-drilling sampling.

Based upon review of the analytical data for each of 14 water wells and one spring presented in this report, and subsequent comparison of these results with regional historical and baseline water-quality databases, this study concludes that these fifteen water sources do not appear to be impacted by natural gas drilling or production activities including hydraulic stimulation.

With the few exceptions noted within the report, there are no significant increases in inorganic parameters when comparing current analyses with baseline conditions or from historical databases. None of the 14 wells or one spring show significant increases in dissolved methane when comparing current analyses with baseline conditions or area-wide baseline databases. Note that the Property Owner A, Property Owner I (142-feet), and Property Owner F wells showed levels of methane that could not be compared to baseline methane concentrations due to the absence of baseline samples. There were also a few detections of organic compounds in some of the wells, but these are not attributable to natural gas drilling, stimulation, or production activities including hydraulic stimulation. The analyses for each of the fifteen water sources demonstrated that most of the individual parameters fell within the ranges and were similar to the mean concentrations for the NURE, NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases for selected areas in Bradford County (and selected areas in western Susquehanna County for the Chesapeake Energy baseline database).

1. INTRODUCTION

The United States Environmental Protection Agency (EPA) is conducting a retrospective study regarding the relationship, if any, between hydraulic fracturing and drinking water resources as described in EPA's "Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources" dated November 2011 (EPA Study). The scope of this report includes the evaluation of data related to water samples collected by Chesapeake Energy contractors, and analysis of water samples by commercial laboratories from 14 water wells and one spring (EPA Study Wells) that were included in EPA's October and November 2011 Bradford County, Pennsylvania (PA) sampling events and were located within the vicinity of Chesapeake Energy's operating area. These 14 water wells and one spring are not inclusive of all EPA sample locations (37 total) but are limited to the sample locations at which Chesapeake Energy was permitted to collect split samples with the EPA in Bradford County, PA. The sample locations at which the property owner would not allow Chesapeake Energy to collect split samples, those EPA deemed confidential, or those that were outside Chesapeake Energy's operating area are not discussed in this report, but their locations are provided on prepared maps within this report.

Chesapeake Energy requested that an evaluation be completed of the sample results by Weston Solutions, Inc. (WESTON®) for the Chesapeake Energy contractor-sampled locations. All laboratory analyses were performed by Eurofins Lancaster Laboratories, Lancaster, Pennsylvania and TestAmerica Laboratory, Nashville, Tennessee. Both laboratories maintain National Environmental Laboratory Accreditation Program (NELAP) accreditation. Chesapeake Energy provided the analytical data for each of the EPA Study Wells; these data are included in the data tables contained in **Appendix A**.

The locations of the 14 water wells and one spring being evaluated in this report have been superimposed on maps of geologic formations, aerial imagery, shaded relief, and topography (**Appendix B, Figures B-1 through B-4**).

This report contains the results of WESTON's evaluation, and includes discussions of the following:

- The geological characteristics and impact of rural activities on groundwater quality in Bradford County (Section 2);

- Evaluation of historic groundwater quality in Bradford County considering geological formations and conditions (Section 3) and exceedances of various screening criteria derived from EPA Maximum Contaminant Levels (MCLs) and Secondary Maximum Contaminant Levels (SMCLs), Pennsylvania Department of Environmental Protection (PADEP) Act 2 Land Recycling Program, and EPA Regional Screening Levels;

- Assessment of the EPA Study Well water-quality data (Section 4) to establish:

  - Comparison of EPA Study Well water quality with historic water-quality data prior to the commencement of Marcellus Shale activities (approximately 2007) in Bradford County, PA;

  - Any significant changes in water quality following baseline sampling;

  - Exceedances of various screening criteria derived from EPA MCLs and SMCLs, PADEP Act 2 Land Recycling Program, and EPA Regional Screening Levels; and

  - General observations regarding the EPA Study Well water-quality data and historic groundwater quality in Bradford County, PA.

- Preparation of Piper tri-linear and Durov diagrams to compare EPA Study Well general water quality with historical data collected from Bradford County to verify aquifers of completion and to determine any significant changes between sampling events (Section 5);

- Summary of observations (Section 6); and

- Conclusions (Section 7).

2. SUMMARY OF BACKGROUND GEOLOGY, HYDROGEOLOGY, HYDROGEOCHEMICAL SYSTEM AND WATER QUALITY FOR BRADFORD COUNTY, PENNSYLVANIA

2.1 GEOLOGY

The data and information provided in this summary were developed from a review of the United States Geological Survey (USGS) and Pennsylvania Geological Survey (PGS) Water Resource Report 68, "Hydrogeology and Groundwater Quality of the Glaciated Valleys of Bradford, Tioga and Potter Counties, Pennsylvania" (Williams, 1998) and other significant documents as referenced in the following sections. The study area (Bradford County) is shown on **Figure B-1** of **Appendix B,** which includes the locations of the 14 water wells and one spring of interest and the underlying surficial or bedrock geology. Bradford County lies within the Susquehanna River drainage basin. The vast majority of the water wells shown on **Figure B-1** are completed in the Catskill Formation, Lock Haven Formation, and/or Glacial Stratified-Drift aquifer systems.

The Catskill and Lock Haven Formations commonly consist of interbedded shale, siltstone, and sandstone of Devonian-Pennsylvanian-age, while the Stratified-Drift aquifer systems are glacial or post-glacial in origin and consist of unconsolidated sand and gravel of Pleistocene age that form extensive unconfined or confined aquifers in the valleys. The outwash is underlain in most major valleys by silt, clay and very fine sand of lacustrine origin that comprise extensive confining units. Bedrock and till are the basal confining units of the Stratified-Drift aquifer systems. The Lock Haven Formation underlies most of the major valleys. The Catskill Formation underlies some of the major valleys in the southern and eastern parts of the study area and much of the uplands. In general, the Catskill Formation is less calcareous and coarser grained than the Lock Haven Formation.

2.2 HYDROGEOLOGY

According to Williams, 1998, the most productive sources of groundwater in Bradford County are the Stratified-Drift aquifers. Specific capacity data from 95 USGS-studied wells indicate that most wells that are completed in the Stratified-Drift aquifers have specific capacities an order of magnitude greater than those completed in till and bedrock. In general, the Stratified-Drift

aquifers have the highest domestic well yields and bedrock aquifers (Catskill and Lock Haven Formations) have the lowest. Yields of most domestic wells completed in till are less than those completed in Stratified-Drift aquifers, but greater than those completed in bedrock. Most domestic well yields are greater in the Catskill Formation than in the Lock Haven Formation. The coarser grained Catskill Formation typically has larger, deeper, and more open natural fractures than the Lock Haven Formation.

2.3 HYDROGEOCHEMICAL SYSTEM

There are two major hydrogeochemical systems within the glaciated valleys of the study area. The **unrestricted groundwater flow zone** is of the calcium bicarbonate type water, and is present within the unconfined and confined Stratified-Drift aquifers, and in the till and shallow bedrock systems. The **restricted groundwater flow zone** is of the sodium chloride type water, and is found in the bedrock, and occasionally in the till and confined Stratified-Drift aquifers. The restricted flow zone water wells identified in the Williams 1998 study are typically in major stream and river valleys. The restricted flow zone water wells containing naturally occurring sodium chloride type water, as identified in the Williams 1998 report for Bradford County, and are shown on **Figure B-1** in **Appendix B**.

In the restricted flow zones, the sulfate concentrations are low, allowing for naturally elevated concentrations of dissolved barium, strontium, and radium. It is hypothesized that anaerobic bacteria convert the sulfate to hydrogen sulfide and methane, which explains the observation of the presence of hydrogen sulfide and methane in water wells completed within the restricted flow zones (Williams 1998). The Williams 1998 study identified 44 water wells that were completed at relatively shallow depths (37 to 720 feet [ft] below ground surface [bgs]; median depth of 200 ft bgs) that contained naturally-occurring sodium chloride type groundwater. Of these 44 water wells, 38 were completed in bedrock formations (23 wells in the Lock Haven Formation and 15 wells in the Catskill Formation), and 6 wells were completed in the confined portions of the glacial stratified drift or till.

2.4 WATER QUALITY

Historic water samples from water wells that penetrate zones having restricted flow contain median concentrations for total dissolved solids (TDS), chloride, dissolved barium, and dissolved strontium, which are 840 milligrams per liter (mg/L), 350 mg/L, 2.1 mg/L, and 1.35 mg/L, respectively (Williams, 1998). Other than strontium, all of these historical median values exceed health-based screening criteria. The TDS and chloride exceed the EPA SMCLs of 500 mg/L and 250 mg/L, respectfully. Barium exceeds the PADEP Act 2 criterion of 2 mg/L for residential use aquifers, and the EPA MCL of 2.0 mg/L. About 50 percent of the wells included in the Williams 1998 report contain water having iron and manganese concentrations that exceed the EPA SCMLs of 0.3 mg/L and 0.05 mg/L, respectively (Williams, 1998). Only water in the unconfined Stratified-Drift aquifers and the Catskill Formation has median concentrations lower than these limits for iron and manganese. Wells completed in till typically yield water having the highest concentrations of both iron and manganese. Williams 1998 also states that "Wells that penetrate zones containing highly saline groundwater commonly produce hydrogen-sulfide and/or methane gas."

2.5 ARSENIC AND COLIFORM

A study of over 700 private water wells in Pennsylvania was conducted in 2006 and 2007 by The Center for Rural Pennsylvania titled "Drinking Water Quality in Rural Pennsylvania and the Effect of Management Practices" (Swistock 2009). Some of the key findings from this report as related to arsenic and coliform concentrations in the tested wells are summarized below.

- Total coliform was present in 33% of the wells.
- Total coliform concentrations correlated with elevated soil moisture associated with wetter periods.
- *E. coli* was present in 14% of the wells.
- *E. coli* was attributed to animal sources impacting surface water that in time reaches groundwater.
- 11% of the wells contained arsenic concentrations at or greater than 6 micrograms per liter (µg/L).
- 2% of wells exceeded an arsenic concentration of 10 µg/L.

- Wells with elevated arsenic concentrations occurred mostly in northern Pennsylvania.
- 41% of wells failed at least one safe drinking-water standard.

The presence of arsenic in drinking-water supplies was described in the USGS publication, "A Retrospective Analysis on the Occurrence of Arsenic in Ground-Water Resources of the United States and Limitations in Drinking-Water-Supply Characterizations" (Focazio, 2000). This report presents the findings of the National Arsenic Occurrence Survey (NAOS; Frey and Edwards, 1997) that was completed in 1995, incorporating the results of stratified random sampling of 275 public water supplies. The report indicates that approximately 15% of the Mid-Atlantic region samples exceeded arsenic levels of 5 µg/L.

"Reconnaissance of Arsenic Concentrations in Ground Water from Bedrock and Unconsolidated Aquifers in Eight Northern-Tier Counties of Pennsylvania" (Low, 2007) discusses a study that included the evaluation of 22 wells and one spring in Bradford County for the presence of arsenic. Total arsenic was detected above the quantitation limit of 0.004 mg/L in three of the wells at concentrations of 0.0053 mg/L, 0.0394 mg/L, and 0.117 mg/L. The latter two of these wells are completed within the Lock Haven Formation. For the eight studied counties in northeastern Pennsylvania, 20% of the wells within the Lock Haven Formation had detectable levels of arsenic and 7% of the wells within the Catskill Formation had detectable levels of arsenic. Where arsenic was detected in the Lock Haven Formation water wells, total arsenic concentrations ranged from 4.5 to 117 µg/L; the median was 14.2 µg/L (Low, 2006). Low, 2007 noted that total arsenic was found with statistically greater frequency if the water well was located in a valley, as compared to a slope or hilltop. Low, 2007 also stated that arsenic was detected with greater frequency in the water of wells completed in the Lock Haven Formation than in the water of wells completed in other formations in these 8 northeast Pennsylvania Counties, including Bradford County. Low, 2007 points out that the Lock Haven Formation is known for its brackish water or saline water and the presence of hydrogen sulfide, and that these waters represent areas where groundwater flow is controlled in part by low-permeability material where sodium and chloride are the dominant anions.

2.6 REFERENCES

The following references were reviewed in the preparation of this document:

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- Focazio, MJ, Welch, AH, Watkins, SA, Helsel, DR and MA Horn, 2000. A Retrospective Analysis on the Occurrence of Arsenic in Ground-Water Resources of the United States and Limitation in Drinking-Water-Supply Characterizations, Water Resources Investigations Report 99-4270, USGS.

- Low, DJ. and DG Galeone, 2007. Reconnaissance of Arsenic Concentrations in Ground Water from Bedrock and Unconsolidated Aquifers in Eight Northern-Tier Counties of Pennsylvania, Open-File Report 2006-1376, USGS.

- Swistock, BR, Clemens, S and WE Sharpe, 2009. Drinking Water Quality in Rural Pennsylvania and the Effect of Management Practices, Center for Rural Pennsylvania, January 2009.

- Williams, JE, Taylor, LE and DJ Low, 1998. Hydrogeology and Groundwater Quality of the Glaciated Valleys of Bradford, Tioga, and Potter Counties, Pennsylvania, PA Geological Survey and USGS, Water Resources Report 68.

- Williams, JH, 2010. Evaluation of Well Logs for Determining the Presence of Freshwater, Saltwater and Gas above the Marcellus Shale in Chemung, Tioga, and Broome Counties, New York, USGS, Scientific Investigations Report 2010-5224.

3. GROUNDWATER DATABASES

Two publically available groundwater databases were used to conduct the historical (pre-2007) statistical analysis of groundwater quality in the study area (Bradford County). The two groundwater databases are both maintained by the USGS and are the National Water Information System (NWIS) and National Uranium Resource Evaluation (NURE). In addition, data published in the USGS and PGS Water Resources Report 68 titled, "Hydrogeology and Groundwater Quality of the Glaciated Valleys of Bradford, Tioga, and Potter Counties, Pennsylvania" (Williams 1998) were also used to conduct a historical descriptive statistical analysis. The locations of the water wells evaluated in these databases are shown on the figures in **Appendix B**. Additionally, descriptive statistical analyses gathered from Chesapeake Energy's Baseline Sampling Program were reviewed for samples located in the immediate vicinity of the wells under consideration. Descriptive statistical summaries for each of the four data sets are included in **Appendix C**.

3.1 NATIONAL WATER INFORMATION SYSTEM (NWIS)

As part of the USGS's program of disseminating water data to the public, the Water Resources Division (WRD) maintains a distributed network of computers and file servers for the storage and retrieval of water data collected through its activities at approximately 1.4 million sites. This system is called the NWIS. The NWIS trace metals and general water-quality parameters include alkalinity, ammonia, arsenic, barium, cadmium, calcium, chloride, chromium, iron, lead, lithium, magnesium, mercury, nitrate, nitrate/nitrite, potassium, silver, sodium, strontium, sulfate, and TDS. A total of 169 water wells were sampled in Bradford County, Pennsylvania between 1935 and 2006 in the Catskill and Lock Haven Formations. These data are available on line from the USGS. These well locations are plotted on the figures in **Appendix B**; data and descriptive statistics have been summarized in tabular form by geologic formation in **Appendix C**.

3.2 NATIONAL URANIUM RESOURCE EVALUATION (NURE)

The NURE program, as a part of a program to identify domestic uranium resources, conducted analyses of groundwater samples from water wells for trace metals and general water-quality

parameters, including alkalinity, bromide, chloride, magnesium, manganese, pH, and sodium. Out of the 164 water wells in this database for Bradford County, 19 or 11.6 percent of the water wells were reported to have hydrogen sulfide odors present at the time of sampling in October, 1977. As noted by Williams (1998) hydrogen sulfide is often associated with the restricted flow zones that contain sodium chloride type groundwater and methane. A total of 160 of the 164 water well samples collected in Bradford County, Pennsylvania during October 1977 were from the Catskill and Lock Haven Formations. These well locations are plotted on the figures in **Appendix B**; summary statistics for these data have been summarized in tabular form by geologic formation in **Appendix C**.

3.3 USGS WATER RESOURCES REPORT 68 (WILLIAMS 1998)

As a part of a study of the hydrogeology and groundwater quality of the glaciated valleys of Bradford, Tioga, and Potter Counties, Pennsylvania, USGS, in cooperation with the PGS, evaluated historical groundwater quality collected from 1935 to 1986. These published data, referred to as the Williams 1998 report data, were used to prepare a database, allowing for plotting of the well locations on the figures (**Appendix B**) and development of descriptive statistical analyses for the various geologic formations (**Appendix C**). The data used for this evaluation were taken from the following tables in the Williams 1998 report and are summarized in tabular form in **Appendix C**:

- Table 12 – Inventory of Well That Produce Water of the Sodium Chloride Type from Restricted-Flow Zones;
- Table 20 – Chemical Analysis of Water from Selected Wells; and
- Table 21 – Record of Wells and Test Holes.

For Bradford County, there are 108 wells that were sampled. These wells were identified as being located in the Catskill Formation, Lock Haven Formation, Stratified Drift – confined, and Stratified Drift – unconfined. In addition, using the data in Table 12 of the Williams report, wells that are located within a restricted flow zone (containing sodium chloride type groundwater) were segregated for a descriptive statistical analysis. The parameters that are included in this database are pH, calcium, magnesium, sodium, potassium, alkalinity, sulfate,

chloride, fluoride, TDS, nitrates, aluminum, arsenic, barium, cadmium, chromium, iron, lead, manganese, nickel, strontium, and zinc.

3.4 CHESAPEAKE ENERGY BASELINE DATA

Chesapeake Energy has been conducting a baseline monitoring program to establish baseline water-quality conditions in nearby water wells prior to drilling and completing gas wells in Pennsylvania. There are nearly 2,000 samples collected in the selected areas considered in this evaluation between 9/17/2009 and 1/10/2012. For the purposes of this report, these well sample locations have been evaluated in three data groups based on geographic proximity to the EPA Study Wells that were allowed to be sampled by Chesapeake Energy's independent contractor:

- Central;
- Eastern; and
- Western.

These areas are shown on a Chesapeake Energy baseline location map and in tabular form in **Appendix C**.

3.5 EVALUATION OF DATABASES

A descriptive statistical analysis was performed on each of the four databases to determine for each parameter the number of detections and the minimum, maximum, median, and mean values. The results of this evaluation are included in **Appendix C**. There is one summary table for each database used.

This evaluation included the following considerations:

- The NURE, NWIS, and Williams 1998 evaluation only included groundwater from water wells;
- The Chesapeake Energy baseline data was for groundwater water wells;
- All water wells and springs are located in Bradford County (except some of the Chesapeake Energy baseline data were gathered from western Susquehanna County since some of the EPA Study Wells were near the county line);

- The NURE, NWIS, and Williams 1998 databases only included data collected prior to 2007 (before significant Marcellus Shale activity began in Bradford County);
- The nitrate data from 1935 (NWIS) was not used since analytical methods and reporting conventions differ from those currently in use;
- Only detected parameters were included in the descriptive statistical analyses;
- Data for total metals and other parameters were used to the maximum extent possible to provide for a consistent comparison with data from the EPA Study Well analyses, which primarily included total metals and other parameters. Exceptions are noted below:
    - Dissolved chloride, lithium, and sulfate values were used from the NWIS database; and
    - All Williams 1998 metals data were reported as dissolved, including arsenic, barium, chloride, iron, manganese, and sodium.

3.6 GEOLOGIC CLASSIFICATION

Geologic classification was performed for both the study wells and the NWIS and NURE database wells to which the study wells were compared. The classification was required for the purposes of developing geochemical statistics for the pertinent geologic units. All classification was based on the Bradford County portions of the following publicly available statewide geologic datasets described below.

- Pennsylvania statewide groundwater information system (PAGWIS). This database contains information as to the geologic zone, or aquifer, of completion for many of the wells contained within; and
- The PGS geologic coverage. The lateral extent of mapped bedrock and glacial deposits are available as shape files, which are an industry standard for sharing geospatial information.

The geologic zone of completion was performed for the NWIS wells using the following procedure.

1. Obtained the PAGWIS aquifer code for 83% (122 of 146) of the NWIS wells present in the PAGWIS database. This was performed using a simple query that links the location identification fields in the two databases;

2. Performed a spatial query for the remaining 17% of the NWIS wells using the bedrock shape file to obtain the bedrock unit within which the well is potentially completed;

3. For those locations having a well depth less than or equal to 120-ft below ground, performed a spatial query to determine if they fall within the footprint of the stratified drift polygon shape file and reassigned the tentative bedrock classification to stratified drift if they fall within the polygon; and

4. If the well depth was unknown or listed as zero or one in the NWIS database, then the well defaulted to the bedrock classification in the database.

The geologic zone of completion for the study water wells and NURE database water wells was determined using steps 2 through 4 of this procedure since none of these wells could be identified in the PAGWIS database using either location identification or proximity.

Eight of the 14 study water wells plus the Property Owner B spring were determined to be completed within the Catskill Formation, or likely obtained water from the Catskill Formation. The remaining six locations were classified as Lock Haven Formation wells. However, geochemical data suggests that the Property Owner C water well is actually completed within a restricted flow zone of the Lock Haven Formation identified by the USGS (Williams, 1998). Also, this well is within 2,000 ft of a well (Br-271) identified by the Williams 1998 report as being in a restricted flow zone, and both wells contain sodium chloride type water consistent with the restricted flow zone described by Williams, 1998. Water well Br-271 is 110 feet bgl in depth, and contained a chloride level of 3,500 mg/L and a TDS level of 6,100 mg/L in a July 20, 1982 sample.

Despite the fact that none of the study water wells were determined conclusively to be completed within glacial units, identification of those NWIS and NURE locations suspected to be completed within glacial units was still required so that these wells could be excluded from statistical evaluations of the bedrock geochemistry.

Information pertaining to completion formation and location within Bradford County (relative to the Chesapeake Energy baseline database) for the 14 study water wells and one spring are summarized in **Table 3-1**:

Table 3-1

Geologic Formations of EPA Study Wells

Property Owner	Bedrock Formation	Special Condition	Location in Bradford Co.*
Property Owner A (300-ft)	Catskill	-	Central
Property Owner B (spring)	Catskill	-	Eastern
Property Owner C (260-ft)	Lock Haven	Restricted Flow Zone	Central
Property Owner D (250-ft)	Lock Haven	-	Central
Property Owner F (200-ft)	Lock Haven	-	Western
Property Owner G (unknown)	Catskill	-	Central
Property Owner E (115-ft)	Catskill	-	Central
Property Owner E (185-ft)	Catskill	-	Central
Property Owner H (340-ft)	Catskill	-	Central
Property Owner I (142-ft)	Catskill	-	Central
Property Owner I (203-ft)	Catskill	-	Central
Property Owner J (unknown)	Lock Haven	-	Central
Property Owner K (175-ft)	Lock Haven	-	Central
Property Owner L (225-ft)	Lock Haven	-	Central
Property Owner M (440-ft)	Catskill	-	Central

*Per Chesapeake Energy map in **Appendix C**

4. EVALUATION OF EPA STUDY WELL WATER QUALITY

EPA Study Well water-quality data from samples collected by Chesapeake Energy's independent contractors were assessed to meet the following objectives:

- To determine whether any of the parameters of interest had experienced significant changes following Chesapeake Energy baseline sampling;
- To compare EPA Study Well water quality with historic water-quality data obtained prior to the commencement of Marcellus Shale activities in Bradford County, PA (approximately 2007);
- To identify any EPA Study Well exceedances of various screening criteria derived from EPA MCLs and SMCLs, PADEP Act 2 Land Recycling Program, and EPA Regional Screening Levels and contrast these EPA Study Well exceedances with historic water well exceedances; and
- To provide general observations regarding the EPA Study Well water-quality data and historic groundwater quality in Bradford County.

This section addresses the process used to complete the evaluation.

Fourteen water wells and one spring were included in the evaluation. The property owners and their sources included:

- Property Owner A (300-ft well);
- Property Owner B (spring);
- Property Owner C (260-ft well);
- Property Owner D (250-ft well);
- Property Owner E (115-ft and 185-ft wells);
- Property Owner F (200-ft well);
- Property Owner G (well, depth unknown);
- Property Owner H (340-ft well);
- Property Owner I (142-ft and 203-ft wells);
- Property Owner J (well, depth unknown);
- Property Owner K (175-ft well);
- Property Owner L (225-ft well); and
- Property Owner M (440-ft well).

Study Well data were received from Chesapeake Energy in an Excel file format (**Appendix A**). The locations of the wells included in this evaluation are shown on the figures in **Appendix B**. Preprocessing of the data was performed to convert the data to file formats suitable for time versus concentration plotting (time plots) and descriptive statistical analysis using Microsoft Excel and geochemical analysis using AquaChem software.

4.1 TIME PLOTS AND COMPARISON WITH HISTORIC STATISTICS

For the time plotting of key analytical parameters and associated descriptive statistical analysis, processing included separation of numeric concentration values from data qualifier flags and conversion of data qualifiers to non-detect and detected values; estimated values were recorded as detected values. Analytes that were not detected were recorded at their sample quantitation limits. Analytes not detected in any of the samples were excluded from further consideration. Post-treatment data were excluded from the data set since these data are not representative of naturally-occurring groundwater conditions.

Time series plots for several water-quality parameters for each of the wells have been prepared and are included in **Appendix D**. Plots have been completed for:

- Total Barium;
- Chloride;
- Total Iron;
- Total Manganese;
- Methane;
- Sodium; and
- TDS.

Chloride, total barium, sodium, TDS, and methane were chosen as key indicator parameters that could indicate the presence of constituents potentially associated with natural gas operations. Total iron and total manganese were selected because they are commonly found in northeastern Pennsylvania groundwater at naturally-occurring levels that commonly exceed their respective water-quality screening parameters. The concentrations of total iron and total manganese were compared and contrasted with the key indicator parameters to determine if there was an associated change in these key parameters that could be related to the total iron and total

manganese values. In addition, baseline data were available for these six analytical parameters. Baseline analytical data existed for eleven of the water wells and the Property Owner B spring split sampled by Chesapeake Energy's contractor during the EPA retrospective sampling. The Property Owner A, Property Owner F, and Property Owner I (142 ft) water wells did not have baseline samples since they were not located within the baseline sampling distance for any Chesapeake Energy natural gas well at the time of their construction.

The Center for Rural Pennsylvania study notes that the key indicator parameters commonly used to indicate impact from gas well drilling brines and waste fluids are chloride, barium, and total dissolved solids. This study also goes on to state that the high concentration of these 3 parameters in brines and waste fluids in relation to typical background concentrations in Pennsylvania groundwater make them useful indicator parameters. According to this study, the approximate median concentrations of chloride, TDS, and barium in Marcellus produced water are 41,850 mg/L, 67,300 mg/L, and 686 mg/L, respectively.

The first data point on each time plot represents baseline conditions (with the exception of the Property Owner A, Property Owner F, and Property Owner I (142 ft) well plots). The plots also provide lines that portray the range of values and some descriptive statistics for each parameter from the NURE, NWIS, and Williams 1998 databases for comparison purposes.

Each of the plots includes statistics from the various databases used for evaluation of historic groundwater-quality conditions in Bradford County, PA. Additionally, these plots also incorporate descriptive statistics derived from Chesapeake Energy's baseline sampling program in Bradford County. These databases are described in Section 3 and statistics are summarized in **Appendix C**.

4.2 COMPARISON OF EPA STUDY WELL DATA WITH SCREENING CRITERIA

The EPA Study Well analyses are summarized and compared to human health risk-based criteria developed from the PADEP Act 2 Land Recycling Program (Residential Used Wells < 2,500 mg/L TDS), EPA MCLs and SMCLs, and/or EPA Regional Screening Levels for Tap Water (Chronic). These criteria values are considered to be conservative risk-based concentrations

which are protective of human health. These summaries are included in **Appendix E** and include the following tables:

- **Table E-1** (Summary of Inorganic Parameters in Chesapeake Energy Split Samples from the EPA Retrospective Study Wells that Exceed the Most Stringent of the Applicable Screening Levels);
- **Table E-2** (Summary of Organic Parameters Detected in Chesapeake Energy Split Samples from the EPA Retrospective Study Wells Compared to Applicable Screening Levels); and
- **Table E-3** (Summary of Dissolved Gases Detected in Chesapeake Energy Split Samples from the EPA Retrospective Study Wells).

Table E-1 includes sample events and inorganic analytical results for the analytes that were detected above the most stringent of the applicable screening criteria for each analyte. For the analytes above the screening criteria for a given well, the baseline, pre-treatment, post-treatment, and dissolved results were also included as available. Parameters such as total barium and total strontium did not exceed the screening criteria for any of the wells, and thus were not included in this table. As would be expected, iron, manganese, and turbidity concentrations exceeded the more stringent screening criteria in a significant portion of the EPA Study Wells: this finding is consistent with the finding for the historical and Chesapeake baseline databases discussed in Section 3.

Table E-2 includes all organic parameter detections, and the baseline, pre-treatment, and post-treatment results for that analyte and well. Of the organics detected, toluene is the only organic parameter that has an EPA or PADEP screening criterion. The PADEP Act 2 standard for toluene is 1,000 µg/L, the EPA MCL is 1,000 µg/L, and the EPA regional screening value (tap water) is 856 µg/L. The other organic chemical detections were all "K" or "JB" qualified data.

Table E-3 includes all light gas detections with corresponding baseline data for each analyte and well. There are no EPA screening criteria for the light gases. The PADEP has a screening level of 7 mg/L (Title 25, Chapter 78.89 (d) 4) where if sustained dissolved methane readings greater than or equal to 7 mg/L are noted, then the PADEP and operator will notify the landowner, and appropriate measures would be undertaken. Four EPA Study Wells; Property Owner C, Property Owner E (115-ft), Property Owner F, and Property Owner I (203-ft); had dissolved methane

concentrations in the baseline and/or subsequent samples which were over 20 mg/L. Two additional EPA Study Wells; Property Owner A and Property Owner E (185-ft); had dissolved methane concentrations in the baseline and/or subsequent samples which were over the PADEP 7 mg/L screening level, but below 20 mg/L. The Property Owner D water well had dissolved methane values present in baseline and/or subsequent samples greater than 3 mg/L but less than 7 mg/L. All of the remaining eight water supply samples had dissolved methane concentrations below 3 mg/L.

The findings for individual EPA Study Wells are discussed in the appropriate section of Section 6.

5. PRESENTATION OF DUROV AND PIPER DIAGRAMS

5.1 PURPOSE OF DUROV AND PIPER DIAGRAMS

Piper and Durov diagrams are commonly used to evaluate groundwater quality and both analytical methods were used to evaluate the groundwater quality in the study area. The Piper diagram provides a simple visual method to present the cation and anion compositions of many different groundwater samples on a single graphic, which can be used to discern data groupings and patterns. The cation and anion concentrations are represented as percentages in order to illuminate the relative proportions of the ions of interest regardless of the total or absolute concentrations. Each sample result is represented by a single point allowing results from many samples to be plotted and evaluated on one graphic. Because the Piper diagram plot only utilizes concentrations represented as percentages, water samples with very different total concentrations can have the same percentage concentrations and plot on the identical location on the diagram.

Durov diagrams were also used to evaluate the study area groundwater-quality data. The Durov diagrams are very similar to the Piper diagrams with the addition of a square and/or two rectangular scaled diagrams located adjacent to the base of two triangles similar to those used in the Piper diagrams. The purpose of the additional square and/or rectangular diagrams is to also present the total or absolute concentrations of two selected parameters such as total cation or ion concentration, total TDS or pH. The concentration of the two selected parameters is depicted on the Durov diagram by extending a straight line from the dot plotted on the triangle representing the relative percentage of three ions, to a line on the diagram representing a concentration of the selected parameter. In this manner, the Durov diagram can be used to present the relative percentage of cations and ions, present the pH values, and present the TDS concentration in mg/L of multiple samples on one graphic.

When the geochemistry of large datasets is evaluated, groupings of samples may be observed which represent similar geochemical characteristics. Often times, there is a correlation between the sample groupings and the geologic regime from which the groundwater samples were collected. For example, groundwater samples collected from shallow unconfined flow zones may represent geochemistry affected by surface runoff, agriculture, and shallow soil chemistry. Whereas, groundwater samples collected from deeper confined and/or bedrock flow zones may

represent geochemistry affected by the geochemistry of the bedrock formation and overlying confining unit.

Geochemical properties and major inorganic ions are calcium, magnesium, sodium, potassium, bicarbonate, carbonate, chloride, and sulfate, which typically occur in natural water in concentrations of 1 mg/L or greater. These constituents exist in pairs of cations and anions, which are typically indicative of the mineralogy of the hydrogeologic setting through which the water has flowed. For instance, calcium-bicarbonate dominant groundwater is indicative of a limestone aquifer, calcium-magnesium bicarbonate dominant water may be indicative of a dolomite aquifer, and sodium-chloride dominant groundwater is typical of a sedimentary setting rich in evaporite salts. Geochemical characterization becomes more complex where the aquifer system consists of a mixture of rock types, if the groundwater has flowed through differing types of rock units, or if groundwater are of different ages and have differing recharge areas. Groundwater quality is largely affected by the composition of the rocks in the aquifer.

5.2 GEOCHEMICAL SIGNATURES IN BRADFORD COUNTY

The study area encompasses two principal bedrock formations, the Devonian-age Lock Haven Formation and the Catskill Formation. The Lock Haven Formation is reported to contain shallow brackish or saline groundwater with the associated presence of hydrogen sulfide and methane in the restricted flow zones (Williams 1998). The Catskill Formation produces groundwater that is generally considered soft and acceptable for most uses, although there are occasions where elevated concentrations of iron, manganese, and TDS can be present in water wells (Williams 1998). The Catskill Formation can also contain naturally occurring sodium-chloride type water in the restricted-flow zones. Approximately 10% of the water wells (11 wells) sampled in the Williams 1998 study were found to be completed in part within the restricted flow zone that contain sodium chloride type water within Bradford County. There were seven other wells listed in the Williams 1998 study in Bradford County where the well was reported salty by the landowner, but no analyses were available. These 18 wells are provided in Table 12 of the Williams 1998 report.

Based on the proportion and actual concentrations of the cations and anions, geochemical signatures for the primary bedrock aquifers underlying Bradford County consist of five general types:

- Calcium-bicarbonate dominant groundwater type; indicative of the unrestricted groundwater flow zones in the Catskill and Lock Haven Formations, and in glacial stratified drift and till;
- Sodium-bicarbonate dominant groundwater type; indicative of the unrestrictive and/or restrictive flow zones in the Catskill and Lock Haven Formations;
- Mixed calcium-sodium bicarbonate groundwater type; indicative of mixtures of water from the restricted and unrestricted flow zones in the Catskill and Lock Haven Formations;
- Calcium-magnesium bicarbonate dominant groundwater type; indicative of the unrestricted groundwater flow zones in the Catskill and Lock Haven Formations, and in glacial stratified drift and till; and
- Sodium-chloride dominant groundwater type; indicative of groundwater within the restricted flow zones of the Lock Haven and Catskill Formations, and in some areas of the glacial stratified drift and till deposits.

Geochemical characterization becomes more complex where the aquifer system consists of a mixture of rock types or if the groundwater has flowed through differing types of rock units. This is especially the case with the Catskill and Lock Haven Formations, which are highly heterogeneous and consist of interbeds of sandstone, conglomerates, siltstone, and shale of differing cementation, permeability, and fracturing. Groundwater quality is largely affected by composition and residence time within each of the rock types comprising the aquifer unit.

5.3 EPA STUDY WELLS

Durov and Piper diagrams were generated for each of the EPA Study Wells to graphically illustrate the chemical distribution of major cations and anions for baseline and post-drilling timeframes. In addition, the wells within the Catskill Formation were plotted together, and the wells within the Lock Haven Formation were plotted together. Mean and median values of constituent concentrations for the historic water well quality databases were also plotted on each of these diagrams for comparison purposes. The Piper and Durov diagrams developed for the study area are included in **Appendix F**.

Catskill Formation

The Catskill Formation typically contains sodium or calcium bicarbonate type groundwater, or a mixed sodium or calcium bicarbonate type groundwater. The eight wells and one spring within the Catskill Formation show a relatively consistent water type (geochemical signature). The water types for the eight wells and one spring completed in the Catskill Formation are noted below:

- Calcium-bicarbonate type (unrestricted): Property Owner G (unknown well depth),\ and Property Owner I (142-ft);
- Calcium-magnesium bicarbonate type (unrestricted): Property Owner M (440-ft) and Property Owner B (spring); and
- Mixed sodium or calcium bicarbonate type (unrestricted and/or restrictive mixture): Property Owner A (300-ft), Property Owner E (115-ft), Property Owner E (185-ft), Property Owner H (340-ft), and Property Owner I (203-ft).

Overall, the groundwater quality in the Catskill Formation wells is typically good. As illustrated in the Piper and Durov plots, the samples collected from these wells are typically low in sulfate and chloride. The plots show that the water quality is relatively consistent over time as shown by the clustering of the samples and indicates there is no significant deviation in water quality from baseline to post-drilling sampling. There is also no significant deviation of the historical water-quality databases (NWIS and Williams, 1998) for the Catskill Formation in Bradford County.

Lock Haven Formation

The six wells within the Lock Haven Formation show a greater range of variability with respect to the water type (geochemical signature) ranging from water quality consistent with the groundwater quality of the Catskill Formation (sodium or calcium bicarbonate type groundwater, or mixed sodium and calcium bicarbonate type groundwater) to the more restrictive-flow type groundwater (sodium chloride) geochemical signatures identified by Williams 1998, as follows:

- Sodium bicarbonate type groundwater (unrestrictive and/or restrictive flow zone): Property Owner D (250-ft) and Property Owner F (200-ft);
- Calcium-magnesium bicarbonate type: (unrestricted flow zone groundwater): Property Owner L (225-ft);

- Mixed sodium or calcium bicarbonate type (unrestricted and/or restricted groundwater flow zone): Property Owner K (175-ft) and Property Owner J (unknown well depth); and

- Sodium-chloride type (restricted flow zone): Property Owner C (260-ft).

Five of the water wells completed in the Lock Haven Formation (Property Owner J, Property Owner K, Property Owner F, Property Owner D, and Property Owner L) showed groundwater of good quality, nearly identical in constituent concentrations to wells located in the Catskill Formation. The sixth well, Property Owner C, contains high naturally occurring concentrations of chloride , sodium, and TDS, and this well is completed in the restrictive flow zone as described by Williams, 1998. As illustrated in the Piper and Durov plots, the samples collected from these wells are typically low in sulfate and chloride (except chloride in the Property Owner C well). The plots show that the EPA Study Well water quality is relatively consistent over time, and that there is no significant deviation in water quality from baseline to post-drilling sampling. There is also no significant deviation of the historical water quality databases (NWIS and Williams, 1998) for the Lock Haven Formation in Bradford County. However, the NWIS Lock Haven mean value on the Piper and Durov diagrams differs significantly from the NWIS median value. The median value is consistent with Lock Haven groundwater quality. The mean value is influenced significantly by approximately 4 data points that exhibit very high chloride values, and those values are more similar to the restrictive flow zone in the Lock Haven. These high chloride values skew the mean significantly for the NWIS Lock Haven data. The NWIS median value is more representative of the water quality present in the unrestrictive flow zone of the Lock Haven Formation.

The Property Owner F and Property Owner D wells showed higher proportions of sodium and chloride compared to the Property Owner J, Property Owner K, and Property Owner L wells, indicating that these wells may be hydraulically connected to a restricted flow zone. As noted in Williams 1998, wells containing mixed groundwater of both the restricted and unrestricted flow zones are common to the Catskill and Lock Haven Formations. The plots show that the EPA Study Well water quality is relatively consistent over time, and that there is no significant deviation in water quality from baseline to post-drilling sampling.

One sodium-chloride type well in the Lock Haven Formation (Property Owner C) exhibits high salinity with elevated concentrations of sodium and chloride for both baseline and post-drill samples compared to the other wells. The Property Owner C well groundwater quality indicates there is a primary contribution of groundwater from the restricted flow zone as described by Williams, 1998. The location of this well is within 2,000 feet of one of the restricted flow zone wells (Br-271) identified in the Williams 1998 report (**Appendix B**), which contains very high concentrations of sodium (2,000 mg/L) and chloride (3,500 mg/L) in a July 20, 1982 sample. The plots show that the EPA Study Well water quality is relatively consistent over time, and that there is no significant deviation in water quality from baseline to post-drilling sampling.

6. SUMMARY OF EPA STUDY WELL EVALUATION

Each EPA Study Well is discussed below to address:

- Any significant changes in concentrations of key indicator parameters that include: methane, chloride, sodium, TDS, and total barium; plus total iron and total manganese that occur naturally throughout the area;
- Any significant changes or differences in water quality since the baseline sample was collected;
- Whether analytes are representative or within ranges of the local historical groundwater quality from various geological formations in the area; or within local baseline ranges for the areas of the retrospective wells sampled by Chesapeake Energy's contractors;
- Any exceedances of screening levels derived from EPA MCLs and SMCLs, PADEP Act 2 Land Recycling Program, and EPA Regional Screening Levels; and
- General observations.

The baseline sample parameters and the EPA retrospective study split sample parameters are listed in **Appendix F**. All analytical results for these water sources are included in **Appendix A**.

Natural groundwater quality in the area of the retrospective EPA wells sampled by Chesapeake Energy's contractors is variable and is principally dependent upon geological formation that the water well is completed within. As noted, Chesapeake Energy has conducted extensive baseline sampling in the area surrounding the EPA retrospective wells, and those data have been evaluated and compared to the retrospective analytical data, along with historical groundwater-quality data for Bradford County. A brief summary of the key baseline analytical data for the areas (Western-W, Central-C, and Eastern-E) surrounding the retrospective wells sampled by Chesapeake Energy's contractors is noted in **Table 6-1**.

Table 6-1

Summary Statistics for Key Parameters – Chesapeake Energy Baseline Database

Parameter and Standard	Number of Baseline Samples			Number of Detections			Number Exceeding Standard			Percent Exceeding Standard		
Area	**W**	**C**	**E**	**W**	**C**	**E**	**W**	**C**	**E**	**W**	**C**	**E**
Arsenic (0.010 mg/L)	1220	1953	542	83	71	10	83	70	10	6.8%	3.6%	1.8%
Barium (2.0 mg/L)	1238	1961	562	1207	1926	557	89	100	15	7.2%	5.1%	2.7%
Iron (0.3 mg/L)	1238	1961	562	843	1103	262	402	419	88	32.5%	21.4%	15.7%
Manganese (0.05 mg/L)	1238	1961	562	880	936	262	663	644	143	53.6%	32.8%	25.4%
Lead (0.005 mg/L)	1220	1953	542	155	179	60	152	174	60	12.5%	8.9%	11.1%
Lithium (0.031 mg/L)	277	254	37	71	40	7	71	40	57	25.6%	15.7%	18.9%
Methane	1238	1965	570	504 40.7%	526 26.8%	157 27.5%	>3:149 >7:95 >20:30	>3:135 >7:73 >20:25	>3:15 >7:19 >20:11	>3:12.0% >7:7.7% >20:2.4%	>3:6.9% >7:3.7% >20:1.3%	>3:2.6% >7:3.3% >20:1.9%
Chloride (250 mg/L)	1238	1960	562	1004	1440	392	54	32	4	4.4%	1.6%	0.7%
TDS (500 mg/L)	1238	1961	562	1236	1961	562	141	54	6	11.4%	2.8%	1.1%

Note: C: Central; W: Western; E: Eastern

As noted in the summary table of key baseline parameters for the areas surrounding the EPA retrospective wells sampled by Chesapeake Energy's contractors, the total arsenic, total barium, total iron, total manganese, total lead, total lithium, dissolved methane, chloride, and TDS are commonly found in groundwater from water wells in these areas at concentrations that **naturally** exceed applicable screening standards. As an example, naturally-occurring dissolved methane was found in detectable levels in groundwater in 1,187 of the 3,773 (31.5%) baseline sample analyzed collectively for the Western, Central, and Eastern areas evaluated in this study. Dissolved methane values over 3 mg/L were found in 299 of the 3,773 (7.9%) baseline samples from these 3 areas. In addition, dissolved methane over 7 mg/L were found in 187 of the 3,773 (5%) baseline samples, and dissolved methane over 20 mg/L were found in 66 of the 3,773 (1.75%) baseline samples for these 3 areas. Clearly, methane occurs in groundwater of the area, and at levels that frequently exceed 3 mg/L.

It is important to point out that common key indicator parameters associated with produced water, drilling fluids, and/or hydraulic stimulation fluids are chloride, sodium, TDS, barium, strontium, bromide, and specific conductance. These parameters would have to be significantly elevated over baseline or regional historical levels to indicate an impact to groundwater sources from these fluids. The total iron and total manganese changes that do not correlate to associated changes with these key water-quality parameters noted above cannot be related to impacts that could be caused by produced water, drilling fluids, and/or hydraulic stimulation fluids. The presence of total iron and total manganese does not by itself indicate an impact from produced water, drilling fluids, or hydraulic stimulation fluids. Total iron and total manganese commonly occur naturally in groundwater from water wells in Bradford County above EPA SMCLs. Williams, 1998 states in the USGS/PGS report that 50% of the wells sampled yielded dissolved iron and dissolved manganese results that exceeded the EPA SMCL. Due to the variability in the sediment content of the individual samples, it is not uncommon to see a wide range in variability between individual sample results, especially total metals results compared to dissolved metals results for both iron and manganese. The variability in the sediment content of the individual samples could be caused by the sample collection methodology (i.e., excessive purge rates) and/or weather conditions (i.e., large storm events).

A discussion of the water quality found in each of the EPA retrospective wells sampled by Chesapeake Energy's contractors is provided in the following paragraphs.

6.1 PROPERTY OWNER A (300-FT WELL)

The Property Owner A well is approximately 300 feet in depth and completed in the Devonian-age Catskill Formation in southeastern Bradford County. Baseline sampling was not completed for this well due to the fact it was not within the baseline sampling boundary for any of the Chesapeake Energy gas wells drilled in the area. Therefore, due to lack of baseline data for this well, analytical results were compared and contrasted to historical values and local baseline values (from the Chesapeake baseline database) from water wells surrounding the Property Owner A water well.

Analytical results were available for the extensive parameters list from the Chesapeake Energy split sample collected on November 4, 2011 in conjunction with the EPA retrospective study. Chesapeake Energy also collected samples from this same well on October 13, 2010 and July 18, 2011 and analyzed these samples for the standard Chesapeake Energy baseline parameter list. Three additional samples were collected for light gas analysis (including methane, ethane, and propane) on August 4, 2011, August 18, 2011, and September 1, 2011. Analytical results were compared to NURE, NWIS, and Williams 1998 databases for the Catskill Formation and the Chesapeake Energy baseline analytical database for the Central core drilling region.

In a review of the figures in **Appendix D-1**, which are time plots of key inorganic parameters and dissolved methane, the detected concentrations of these parameters were evaluated. The November 4, 2011 sample exhibited extremely high turbidity (865 Nephelometric Turbidity Units [NTU]) and total suspended solids (TSS) (1,430 mg/L and 312 mg/L). It was noted by the sampling contractor that the flow (estimated at 10 gallons per minute [gpm]) could not be regulated and the turbidity varied between 4 and 1,200 NTU during the purging. Also, the pump was not operating properly as evidenced by the well pump quitting and a noticeable burning smell. In previous samples, the turbidity readings were noted at 33 NTU (October 13, 2010) and 36 NTU (July 18, 2011). The EPA MCL for turbidity is 5 NTU for finished public drinking-water supplies. More importantly, high turbidity and TSS values can affect the total metal

results. The evaluation presented below indicates that the high turbidity and TSS significantly impacted the concentration of other parameters of interest.

Total barium and total manganese concentrations are higher in the November 4, 2011 sample as compared to the October 13, 2010 sample. Especially for barium and to a lesser extent for manganese, these higher values on November 4, 2011 appear to be associated with high turbidity. For the November 4, 2011 sample, the total barium and total manganese concentrations were measured at 0.616 mg/L (total barium) and 1.15 and 1.34 mg/L (total manganese). Dissolved barium and dissolved manganese were measured at 0.354 mg/L (dissolved barium) and 0.959 and 1.02 and 1.03 mg/L (dissolved manganese), respectively. Total iron was measured at 6.19 mg/L (October 13, 2010), 0.786 mg/L (July 18, 2011), and 3.88 mg/L and 14.5 mg/L (November 4, 2011). Dissolved iron was measured at <0.05 mg/L (July 18, 2011) and 0.0845 mg/L (November 4, 2011), indicating that most of the iron is in the suspended solids associated with the high turbidity.

The total manganese and total iron results are generally higher than the historical background data mean value available from the NURE, NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases. However, the total iron and total manganese values are still well within the baseline ranges for these parameters for the Central core area. The total barium results also fall within the range of concentrations in the Chesapeake Energy baseline database. As noted, the higher levels of total iron, and to a lesser extent, total manganese are likely due to the suspended sediment in those samples. Total metals analyses are performed on raw samples that have been preserved with nitric acid; the preservation process causes the metals that occur naturally in the suspended solids to dissolve into the aqueous phase. Correspondingly, dissolved metals are measured on a sample that is filtered in the field to remove suspended sediment prior to field preservation with nitric acid. Due to the variability in the sediment content of the individual samples, it is not unexpected to see variability between individual sample results, especially total metals results compared to dissolved metals results for iron and manganese. Based upon the analytical data presented in this report this well does not appear to be impacted from natural gas drilling and production activities including hydraulic stimulation.

The concentrations for chloride and TDS were stable over the three sampling events. Sodium showed a slight decline in concentration over time. The time plots in **Appendix D-1** show that the concentrations of these parameters generally fall well within the range of concentrations for each of these parameters as compared to the historical background data available from the NURE, NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases for Bradford County.

Total aluminum, total arsenic, total iron, total lead, total manganese, and turbidity exceeded the screening criteria (**Table E-1**) for this well. Total and dissolved aluminum analyses were only available for the November 4, 2011 sample, which had unusually high turbidity and TSS. It was apparent, upon evaluation of the total aluminum (1.44 and 6.26 mg/L) and dissolved aluminum (0.0566 mg/L) results, a majority of the aluminum was associated with suspended solids in the November 4, 2011 sample. The dissolved aluminum concentration was found to be well below the most stringent screening criterion (EPA MCL) of 0.2 mg/L; however, the total aluminum concentration caused by high turbidity exceeded this value. It should be noted that, based on the Williams 1998 database containing data from 1935 through 1986, 67% of the wells located in the Catskill Formation had aluminum concentrations that exceeded the EPA SMCL for aluminum.

Total arsenic was analyzed for the Chesapeake Energy and EPA split samples collected on October 13, 2010 and November 4, 2011, respectively. The October 13, 2010 sample indicated a concentration of 0.01 mg/L, which is above the most stringent criterion (EPA regional screening value) of 0.000045 mg/L, and at the MCL for arsenic of 0.01 mg/L. The November 4, 2011 sample contained 0.0122 mg/L total arsenic and 0.00416 mg/L dissolved arsenic when the turbidity and TSS were unusually high, which are also above the EPA regional screening value, but the dissolved arsenic value was below the EPA MCL. Based on the NWIS, Williams 1998, and Chesapeake Energy baseline databases, 100% of the wells with detected arsenic exceeded the EPA regional screening value for arsenic. Based on the Chesapeake Energy baseline database, 99% of the wells with detected arsenic exceeded the EPA MCL, and for baseline water wells sampled in the Central area, 70 of 1,953 (3.6%) baseline samples had arsenic levels that naturally exceeded the EPA MCL.

Total iron exceeded the most stringent criterion (EPA SMCL) of 0.3 mg/L on all three samples, with concentrations of 6.19 mg/L (October 13, 2010), 0.786 mg/L (July 18, 2011), and 3.88 and 14.5 mg/L (November 4, 2011). The latter two samples had significantly lower dissolved iron concentrations, which were below the detection limit of 0.05 mg/L (July 18, 2011 sample) and at 0.0845 mg/L (November 4, 2011 sample), both well below the EPA SMCL. Based on the NWIS, Williams 1998, and Chesapeake Energy baseline databases, 40%, 50%, and 38% of the wells with detected iron exceeded the EPA SMCL for iron, respectively.

Total lead was analyzed for the samples collected on October 13, 2010 and November 4, 2011. Total lead in the October 13, 2010 sample was below the detection limit of 0.005 mg/L. The November 4, 2011 sample contained 0.0353 and 0.0377 mg/L total lead when the turbidity and TSS were unusually high, which is above the most stringent screening criterion (Pennsylvania Department of Environmental Protection [PADEP] Act 2) of 0.005 mg/L and the EPA action level of 0.015 mg/L. However, dissolved lead was below the detection level of 0.002 mg/L for this November 4, 2011 sample. Based on the Williams 1998 and Chesapeake Energy baseline databases, 100% and 97% of the wells with detected lead exceeded the PADEP Act 2 value for lead, respectively. In the Chesapeake Energy baseline database, approximately 36.9% of wells with detected lead exceeded the EPA action level of 0.015 mg/L. Out of the 1,953 baseline water well samples in the central core area, 66 total lead values exceeded the EPA action level of 0.015 mg/L or approximately 3.4% of the baseline samples collected in this area.

Total manganese exceeded the most stringent criterion (EPA SMCL) of 0.05 mg/L on all three samples, with concentrations of 0.369 mg/L (October 13, 2010), 0.912 mg/L (July 18, 2011), and 1.15 and 1.34 mg/L (November 4, 2011). The July 18, 2011 sample contained 0.788 mg/L dissolved manganese and the November 4, 2011 sampled contained 0.959, 1.02, and 1.03 mg/L dissolved manganese. The sodium, TDS, and chloride do not correspond with the apparent change in total manganese concentration, suggesting that the change in manganese levels are not related to natural gas drilling or production activities including hydraulic stimulation. Based on the NURE, NWIS, Williams 1998, and Chesapeake Energy baseline databases, 100%, 47%, 50%, and 69% of the wells with detected manganese exceeded the EPA SMCL for manganese, respectively. Out of the 1,961 baseline water well samples in the Central core area, 644 total

manganese values exceeded the EPA SMCL of 0.050 mg/L or approximately 32.8% of the baseline samples collected in this area.

Turbidity has exceeded the EPA MCL of 5 NTU on all three sampling events. The turbidity results for these three events are 33 NTU (October 13, 2010), 36 NTU (July 18, 2011), and 865 NTU (November 4, 2011). Based on the Chesapeake Energy baseline database, 29% of the wells with measureable turbidity exceeded the EPA MCL for turbidity.

The Piper and Durov diagrams for this well in **Appendix F** indicate the water is of a calcium-sodium bicarbonate type. These diagrams confirm that the water quality in the Property Owner A well is consistent between the individual samples of the well and is also of a type consistent with the background water quality from the NWIS, Williams 1998, and Chesapeake Energy baseline databases.

Light gases were measured six times as indicated in **Table E-3**. Methane concentrations steadily declined from the October 13, 2010 value of 8.36 mg/L to a value of 1.86 mg/L in the November 4, 2011 sample (see figure in **Appendix D-1**). Ethane followed a similar decline from its October 13, 2010 value of 0.192 mg/L to a value of 0.0117 mg/L in the November 4, 2011 sample. No other light gases were detected in the Property Owner A well samples. The light gases detected in these samples are likely naturally occurring, and, based on the analytical data presented in this report, this well does not appear to be impacted from natural gas drilling or production activities including hydraulic stimulation when compared to Chesapeake baseline data for the Central core area.

Tests for the presence of fecal coliform and total coliform bacteria were positive for the one sample that was analyzed for this consistuent (November 4, 2011). This is not unusual for rural wells in Pennsylvania as discussed in Section 2. Total coliform was reported to be present in 33% of Pennsylvania rural drinking water wells (Swistock 2009). *E. coli* was not detected in the well sample.

No glycols, pesticides, purgeable or extractable petroleum hydrocarbons, dissolved organic carbon (DOC), or low molecular weight acids were detected in the November 4, 2011 EPA retrospective split sample. Dissolved inorganic carbon (DIC) was detected at a concentration of

25.9 mg/L. Toluene, the only volatile organic compound detected, was measured in the October 13, 2010 sample at a concentration of 100 µg/L, but was not detected in the EPA retrospective split sample. Toluene is a common laboratory contaminant and is not generally utilized in hydraulic stimulations. Squalene, the only semi-volatile organic compound detected, was measured at an estimated concentration of 6 J mg/L in the EPA retrospective split sample. Squalene is not used in hydraulic stimulation formulations. Squalene is a pharmaceutical and naturally-occurring substance in plants and animals as part of the cholesterol synthesis process. It is also present in cosmetics.

Because no baseline data were available for this water well, other data were reviewed and contrasted with the analytical data collected from the Property Owner A water well. Based on the analytical data presented in this report and review of the historical and baseline data sets, and comparison to other parameters present in the water well (such as sodium, chloride, and TDS levels), it is considered unlikely that there has been impact to this water well from natural gas drilling and production activities including hydraulic stimulation. The two organics detected are not associated with natural gas operations.

6.2 PROPERTY OWNER B (SPRING)

The Property Owner B spring is located within the Catskill Formation in southeastern Bradford County. Analytical results for the Chesapeake Energy baseline parameter list were available for a baseline sample collected on October 14, 2010 from this spring. Analytical results were also available for the more extensive parameters list from the Chesapeake Energy split sample collected on November 4, 2011 in conjunction with the EPA retrospective study. Analytical results were compared to NURE, NWIS, and Williams 1998 databases for the Catskill Formation and the Chesapeake Energy baseline analytical database for the Eastern core drilling region.

The analytical results for the inorganics and total metals were consistent between the two sampling events. Total iron and total manganese were not detected in these samples. As can be noted from a review of the figures in **Appendix D-2**, which are time plots of key inorganic parameters and methane, the concentrations for chloride, TDS, sodium, and total barium were stable over the two sampling events. Time plots show that the concentrations of these parameters are very similar to the baseline sample concentrations collected from this spring. The analytical

results for this spring also fall well within the range of concentrations for each of these parameters as compared to the historical background data available from the NURE, NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases. All metals and other inorganic constituents found in water from this spring are naturally occurring, and based on the analytical data presented in this report; this spring does not appear to be impacted by natural gas drilling, and production activities including hydraulic stimulation.

The only metals or general water-quality parameter that was not within the screening criteria was pH. The pH was measured at 6.3 (baseline) and 6.1 (EPA retrospective study split sample). The EPA SMCL for pH is between 6.5 and 8.5 pH units. The pH values associated with wells in Bradford County have been observed as low as 6.2 (NURE - Catskill), 6.5 (Williams 1998 - Catskill), and 5.6 (Chesapeake Energy baseline – Eastern region).

The Piper and Durov diagrams for this spring are provided in **Appendix F and** indicate the water is of a calcium-magnesium bicarbonate type.. These diagrams confirm that the water quality of the Property Owner B spring is consistent between the individual samples of the spring and is also consistent with the background water quality from the NWIS (Bradford County), Williams 1998 (Bradford County), and Chesapeake Energy baseline (selected samples from Bradford and western Susquehanna Counties) databases.

No light gases were detected in any of the samples from this spring.

Tests for the presence of *E. coli*, fecal coliform, and total coliform bacteria were positive for the one sample analyzed (the EPA retrospective well split sample). The *E. coli* and total coliform were confirmed present and the fecal coliform was measured at 5/100 ml. This is not unusual for surface waters or springs.

No glycols, pesticides, purgeable or extractable petroleum hydrocarbons, low molecular weight acids, semi-volatile organic compounds, or volatile organic compounds were detected in the November 4, 2011 EPA retrospective split sample. DIC was detected at a concentration of 5.24 mg/L. DOC was detected at a concentration of 1.08 mg/L.

Based on the analytical data presented in this report, this spring does not appear to be impacted by natural gas drilling or production activities including hydraulic stimulation.

6.3 PROPERTY OWNER C (260-FT WELL)

The Property Owner C well is approximately 260 feet in depth and completed in the Devonian-age Lock Haven Formation in southeastern Bradford County. Based on its groundwater quality and location (within 2,000 feet of one of the restricted flow zone wells identified in the Williams 1998 report), it is believed to be screened within the restricted flow zone described in Section 2. This well is within 2000 feet of Br-271 as described in the Williams 1998 report, which contained high levels of sodium (2,000 mg/L) and chloride (3,500 mg/L) in a July 20, 1982 sample. Analytical results for the Chesapeake Energy baseline parameter list were available for a baseline sample collected on April 29, 2011 from this water well. Analytical results were also available for the more extensive parameters list from the Chesapeake Energy split sample collected on October 27, 2011 in conjunction with the EPA retrospective study. Analytical results were compared to NURE and NWIS databases for the Lock Haven Formation and the Chesapeake Energy baseline analytical database for the Central core drilling region. Analytical results were also compared to the restricted flow zone well analytical results from the Williams 1998 database, and even more specifically to analytical results for nearby well Br-271 in the Williams 1998 database, which is also located in the restricted flow zone.

As can be noted from a review of the figures in **Appendix D-3**, which are time plots of key inorganic parameters and methane, the concentrations for chloride, TDS, sodium, total iron, total manganese, and total barium were stable over the two sampling events. Time plots show that the concentrations of these parameters are very similar to the baseline sample concentrations collected from this well. The analytical results for this well also generally fall well within the range of concentrations for each of these parameters as compared to the historical background data available from the NURE, NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases. Sodium and chloride concentrations for this well are outside the NURE range of concentrations because the Property Owner C well is located within a restricted flow zone, but do fall within the NWIS, Williams restricted flow zone and Chesapeake baseline databases. The descriptive statistics for the Williams 1998 database used for the Property Owner C well (which exclusively incorporated wells in a restrictive flow zone) are most appropriate for comparison, especially for total barium, sodium, chloride, and TDS. The total and dissolved metals results for the October 27, 2011 sample were consistent with baseline levels. All metals

and other inorganic constituents found in groundwater from this well are naturally occurring, and based on the analytical data presented in this report, this well does not appear to be impacted from natural gas drilling or production activities including hydraulic stimulation.

The total aluminum, total arsenic, chloride, total iron, and TDS exceeded the screening criteria (**Table E-1**). Total aluminum was measured once on October 27, 2011 and exceeded the most stringent screening criterion (EPA SMCL) of 0.2 mg/L. Total aluminum was measured at 0.262 mg/L and dissolved aluminum was not detected at <0.02 mg/L, indicating that most of the aluminum is associated with the suspended solids in the sample. The dissolved aluminum is well below the EPA SMCL value. Note that the sample from nearby well Br-271 contained 0.16 mg/L of dissolved aluminum (Williams 1998).

Samples collected on April 29, 2011 (baseline) and October 27, 2011 were analyzed for total arsenic. Total arsenic was not detected in the baseline sample (<0.010 mg/L), but the October 27, 2011 sample contained 0.0076 mg/L total arsenic and 0.00456 mg/L dissolved arsenic, which are above the most stringent criterion (EPA regional screening value) of 0.000045 mg/L, but both were below the EPA MCL of 0.01 mg/L, and also below the baseline detection limit of 0.010 mg/L. Based on the NWIS, Williams 1998, and Chesapeake Energy baseline databases, 100% of the wells with detected arsenic exceeded the EPA regional screening value for arsenic. Based on the NWIS, Williams 1998, and Chesapeake Energy baseline databases, 78%, 67%, and 99% of the wells with detected arsenic exceeded the EPA MCL. Arsenic results were not available for nearby well Br-271 (Williams 1998).

Both samples were analyzed for chloride, which was detected at 413 mg/L in the baseline sample and 351 mg/L in the October 27, 2011 sample. These values exceed the SMCL value of 250 mg/L for chloride. Based on the Williams 1998 database (restricted flow zone), 64% of the wells exceeded the SMCL for chloride for wells completed in this restricted flow zone. Chloride was measured at 3,500 mg/L for nearby well Br-271 (Williams 1998).

Both samples were analyzed for TDS, which was detected at 842 mg/L in the baseline sample and 726 mg/L in the October 27, 2011 sample. These values exceed the SMCL value of 500 mg/L for TDS. Based on the Williams 1998 database (restricted flow zone), 78% of the wells

exceeded the SMCL for TDS for wells completed in the restricted flow zone. TDS was measured at 6,100 mg/L for nearby well Br-271 (Williams 1998).

Total iron exceeded the most stringent criterion (EPA SMCL) of 0.3 mg/L in the October 27, 2011 sample. It was detected at 0.285 mg/L (baseline) and 0.368 mg/L (October 27, 2011). The dissolved iron concentration for the October 27, 2011 sample was below the detection limit of <0.05 mg/L. Based on the NWIS, Williams 1998 (restricted flow zone), and Chesapeake Energy baseline databases, 61%, 67%, and 38% of the wells with detected iron exceeded the EPA SMCL for iron. Dissolved iron was measured at 0.8 mg/L for nearby well Br-271 (Williams 1998).

The Piper and Durov diagrams for this well are provided in **Appendix F and** indicate the water is of a sodium-chloride type. These diagrams confirm that the water quality in the Property Owner C well is consistent between the individual samples of the well and is also consistent with the background water quality from the Williams 1998 restricted flow zone well data for Bradford County.

Light gases were measured two times as indicated in **Table E-3**. Methane was detected in both samples (see figure in **Appendix D-3**) at 21.5 mg/L (baseline) and 22.5 mg/L (October 27, 2011). No other light gases were detected in the Property Owner C well samples. As noted in Williams 1998, elevated levels of methane and hydrogen sulfide are associated with the restricted flow zone groundwater. The light gases detected in these samples are naturally occurring, and, based on the analytical data presented in this report, this well does not appear to be impacted from natural gas drilling or production activities including hydraulic stimulation. In addition, naturally-occurring dissolved methane values >20 mg/L have been detected in 25 of the baseline samples in the Central core area evaluated.

Tests for the presence of *E. coli*, fecal coliform and total coliform bacteria were negative for the one sample that was analyzed (October 27, 2011).

No volatile organic compounds, semi-volatile compounds, glycols, pesticides, purgeable or extractable petroleum hydrocarbons, DOC, or low molecular weight acids were detected in the October 27, 2011 EPA retrospective split sample. DIC was detected at a concentration of 36.4 mg/L.

6.4 PROPERTY OWNER D (250-FT WELL)

The Property Owner D well is approximately 250 feet in depth and completed in the Devonian-age Lock Haven Formation in southeastern Bradford County. Analytical results for the Chesapeake Energy baseline parameter list were available for a baseline sample collected on January 10, 2010 from this water well. Analytical results were also available for the more extensive parameters list from the Chesapeake Energy split sample collected on October 28, 2011 in conjunction with the EPA retrospective study. Chesapeake Energy also collected a sample from this same well on June 10, 2011 and analyzed that sample for the standard Chesapeake Energy baseline parameter list. Analytical results were compared to NURE, NWIS, and Williams 1998 databases for the Lock Haven Formation and the Chesapeake Energy baseline analytical database for the Central core drilling region.

The analytical results for the inorganics, dissolved methane, and total metals were consistent between the three sampling events. As can be noted from a review of the figures in **Appendix D-4**, which are time plots of key inorganic parameters and dissolved methane, the concentrations for total barium, chloride, TDS, total iron, total manganese, and sodium were stable over the three sampling events. Time plots show that the concentrations of these parameters are very similar to the baseline sample concentrations collected from this well. The analytical results for this well also fall well within the range of concentrations for each of these parameters as compared to the historical background data available from the NURE, NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases for Bradford County. All metals and other inorganic constituents found in groundwater from this well are naturally occurring, and, based on the analytical data presented in this report, this well does not appear to be impacted from natural gas drilling or production activities including hydraulic stimulation.

The only metals or general water-quality parameter that was not within the screening criteria was pH. The pH was measured at 8.2 (baseline) and 8.8 (June 10, 2011). The EPA SMCL for pH is between 6.5 and 8.5 pH units. Note that pH values associated with wells in Bradford County have been observed as high as 8.8 (NURE – Lock Haven), 8.6 (Williams 1998 – Lock Haven), and 8.5 (Chesapeake Energy baseline – Central region).

The Piper and Durov diagrams for this well in **Appendix F** indicate the water is of a mixed calcium-sodium bicarbonate type. These diagrams confirm that the water quality of the Property Owner D is consistent between the individual samples from this well, but is also influenced to some extent by water coming from a restricted flow zone as seen by higher proportions of sodium as compared with calcium.

Light gases were measured three times as indicated in **Table E-3**. Methane was detected in all samples (see figure in **Appendix D-4**) at concentrations of 3.55 mg/L (baseline), 4.81 mg/L (June 10, 2011), and 2.11 mg/L (October 28, 2011), showing no significant change from baseline. No other light gases were detected in the Property Owner D well samples. The light gases detected in these samples are naturally occurring, and, based on the analytical data presented in this report, this well does not appear to be impacted from natural gas drilling or production activities including hydraulic stimulation.

The test for the presence of total coliform bacteria was positive for the one sample that was analyzed (EPA retrospective study split sample). This is not unusual for rural wells in Pennsylvania as discussed in Section 2. Total coliform was reported to be present in 33% of Pennsylvania rural drinking water wells (Swistock 2009). *E. coli* and fecal coliform were not detected in the well sample.

No glycols, pesticides, purgeable or extractable petroleum hydrocarbons, DOC, low molecular weight acids, semi-volatile organic compounds, or volatile organic compounds were detected in the October 28, 2011 EPA retrospective split sample. DIC was detected at a concentration of 50.6 mg/L.

6.5 PROPERTY OWNER E (115-FT WELL)

The shallower of the two Property Owner E wells is approximately 115 feet in depth and completed in the Devonian-age Catskill Formation in southeastern Bradford County. Analytical results for the Chesapeake Energy baseline parameter list were available for a baseline sample collected on April 1, 2010 from this water well. Analytical results were also available for the more extensive parameters list from the Chesapeake Energy split sample collected on November 4, 2011 in conjunction with the EPA retrospective study. Chesapeake Energy also collected two

additional samples from this same well on August 12, 2010 and January 8, 2011, and analyzed the samples for the standard Chesapeake Energy baseline parameter list. Analytical results were compared to NURE, NWIS, and Williams 1998 databases for the Catskill Formation and the Chesapeake Energy baseline analytical database for the Central core drilling region.

The analytical results for the inorganics, dissolved methane, and total metals were consistent between the four sampling events. As can be noted from a review of the figures in **Appendix D-5**, which are time plots of key inorganic parameters and dissolved methane, the concentrations for total barium, chloride, total manganese, total iron, TDS, and sodium were stable over the four sampling events. Time plots show that the concentrations of these parameters are very similar to the baseline sample concentrations collected from this well. The analytical results for this well also fall well within the range of concentrations for each of these parameters as compared to the historical background data available from the NURE, NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases for Bradford County. All metals and other inorganic constituents found in groundwater from this well are naturally occurring, and, based on the analytical data presented in this report, this well does not appear to be impacted from natural gas drilling or production activities including hydraulic stimulation.

The only metals or general water-quality parameter that was not within the screening criteria was total manganese. Total manganese exceeded the most stringent criterion (EPA SMCL) of 0.05 mg/L for all of the samples. It was detected at 0.118 mg/L (baseline), 0.127 mg/L (August 12, 2010), 0.133 mg/L (January 8, 2011), and 0.116 mg/L (November 4, 2011). The last sample was also analyzed at 0.113 mg/L for dissolved manganese. There was no significant change noted in total manganese between baseline and the samples collected afterwards. Based on the NURE, NWIS, Williams 1998, and Chesapeake Energy baseline databases, 100%, 47%, 50%, and 69% of the wells with detected manganese exceeded the EPA SMCL, respectively.

The Piper and Durov diagrams for this well in **Appendix F** indicate the water is of a mixed sodium-calcium bicarbonate type. These diagrams confirm that the water quality of the Property Owner E 115-ft well is consistent between the individual samples of the well and is also consistent with the background water quality from the NWIS, Williams 1998, and Chesapeake Energy baseline databases for Bradford County.

Methane and ethane are the only two light gases that have been detected in the well water. Methane has stayed consistent at measurements of 33.8 mg/L (baseline), 34.7 mg/L (August 12, 2010), 35.8 mg/L (January 8, 2011), and 37.1 mg/L (November 4, 2011). This is shown on the methane figure in **Appendix D-5**. Ethane has been detected at low concentrations of 0.49 mg/L (baseline), 0.0495 mg/L (August 12, 2010), 0.0838 mg/L (January 8, 2011), and 0.0816 mg/L (November 4, 2011). The light gases detected in these samples are naturally occurring, and based on the analytical data presented in this report, this well does not appear to be impacted from natural gas drilling or production activities including hydraulic stimulation.

Tests for the presence of *E. coli*, fecal coliform and total coliform bacteria were negative for the one sample that was analyzed (November 4, 2011).

No pesticides, purgeable or extractable petroleum hydrocarbons, DOC, low molecular weight acids, semi-volatile organic compounds, or volatile organic compounds were detected in the November 4, 2011 EPA retrospective split sample. DIC was detected at a concentration of 25.5 mg/L. Diethylene, tetraethylene, and triethylene glycols were reported in the November 4, 2011 sample at the estimated values of 13J mg/L, 26J mg/L, and 20J mg/L, respectively. These compounds were also found in the laboratory blanks, indicating analytical laboratory contamination. Thus, there is concern regarding the validity of these results. Note that glycols were not found in the deeper Property Owner E well. Chesapeake Energy conducted a review of hydraulic stimulation materials used in this area and has determined that diethylene, triethylene, and tetraethylene glycol were not used as hydraulic stimulation additives on well sites in this area. Glycols are utilized in numerous industrial and consumer products. The estimated detections of these compounds are believed to be an analytical contamination issue.

6.6 PROPERTY OWNER E (185-FT WELL)

The deeper of the two Property Owner E wells is approximately 185 feet in depth and completed in the Devonian-age Catskill Formation in southeastern Bradford County. Analytical results for the Chesapeake Energy baseline parameter list were available for a baseline sample collected on April 1, 2010 from this water well. Analytical results were also available for the more extensive parameters list from the Chesapeake Energy split sample collected on November 4, 2011 in conjunction with the EPA retrospective study. Chesapeake Energy also collected two additional

samples from this same well on August 12, 2010 and January 8, 2011, and analyzed the samples for the standard Chesapeake Energy baseline analytical parameter list. Analytical results were compared to NURE, NWIS, and Williams 1998 databases for the Catskill Formation and the Chesapeake Energy baseline analytical database for the Central core drilling region.

The analytical results for the inorganics and total metals were consistent between the four sampling events. As can be noted from a review of the figures in **Appendix D-6**, which are time plots of key inorganic parameters and dissolved methane, the concentrations for total barium, chloride, total manganese, total iron, TDS, and sodium were stable over the four sampling events. Time plots show that the concentrations of these parameters are very similar to the baseline sample concentrations collected from this well. The analytical results for this well also fall well within the range of concentrations for each of these parameters as compared to the historical background data available from the NURE, NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases for Bradford County. All metals and other inorganic constituents found in groundwater from this well are naturally occurring, and based on the analytical data presented in this report, this well does not appear to be impacted from natural gas drilling or production activities including hydraulic stimulation.

The only metals or general water-quality parameter that was not within the screening criteria was total manganese. Total manganese exceeded the most stringent criterion (EPA SMCL) of 0.05 mg/L for two of the samples. It was detected at 0.0647 mg/L (baseline) and 0.0788 mg/L (August 12, 2010). There is no significant change in total manganese levels from baseline. Based on the NURE, NWIS, Williams 1998, and Chesapeake Energy baseline databases, 100%, 47%, 50%, and 69% of the wells with detected manganese exceeded the EPA SMCL, respectively.

The Piper and Durov diagrams for this well in **Appendix F** indicate the water is of a mixed calcium-sodium bicarbonate type. These diagrams confirm that the water quality of the Property Owner E 185-ft well is consistent between the individual samples of the well and is also consistent with the background water quality from the NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases for Bradford County.

Methane is the only light gas that has been detected in the well water. Methane has shown a significant decline from baseline conditions with measurements of 8.88 mg/L (baseline), 9.68 mg/L (August 12, 2010), 0.239 mg/L (January 8, 2011), and 0.609 mg/L (November 4, 2011). The change in methane values noted may be due to natural variability or sample variability, and also may be related to well use. Well use can considerably change the dissolved methane content in groundwater, due to changes in head during prior well use or during sampling events. This is shown on the methane figure in **Appendix D-6**. The light gases detected in these samples are naturally occurring, and based on the analytical data presented in this report, this well does not appear to be impacted from natural gas drilling or production activities including hydraulic stimulation.

Tests for the presence of *E. coli*, fecal coliform and total coliform bacteria were negative for the one sample that was analyzed (November 4, 2011).

No glycols, pesticides, purgeable or extractable petroleum hydrocarbons, DOC, low molecular weight acids, semi-volatile organic compounds, or volatile organic compounds were detected in the November 4, 2011 EPA retrospective split sample. DIC was detected at a concentration of 27.9 mg/L.

6.7 PROPERTY OWNER F (200-FT WELL)

The Property Owner F well is approximately 200 feet in depth and completed in the Devonian-age Lock Haven Formation in southwestern Bradford County. No baseline sample is available from this well since it was located outside of the standard baseline sampling radius. Therefore, evaluation of analytical data from this water well was made by contrasting data from this well with historical databases; review of other parameters such as chloride, TDS, and sodium from this well; and review of the local Chesapeake Energy baseline database surrounding this water well. Analytical results were available for the extensive parameters list from the Chesapeake Energy split sample collected on October 25, 2011 in conjunction with the EPA retrospective study. Chesapeake Energy collected samples from this same well on March 10, 2011 and November 11, 2011 and analyzed these samples for the standard Chesapeake Energy baseline analytical parameter list. Analytical results were compared to NURE, NWIS, and Williams 1998

databases for the Lock Haven Formation and the Chesapeake Energy baseline analytical database for the Western core drilling region.

The analytical results for the inorganics, dissolved methane, and total metals were consistent between the three sampling events. As can be noted from a review of the figures in **Appendix D-7**, which are time plots of key inorganic parameters and dissolved methane, the concentrations for chloride, TDS, sodium, total iron, total manganese, and total barium were stable over the three sampling events. Time plots show that the concentrations of these parameters show little change with time. The analytical results for this well also generally fall well within the range of concentrations for each of these parameters as compared to the historical background data available from the NURE, NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases for Bradford County. Barium concentrations within the water well were higher than the Williams 1998 range of values for the Lock Haven Formation unrestrictive flow zone. However, it is believed based upon the water-quality from this well, that this well is completed in both the restricted flow zone and unrestrictive flow zones as described by Williams, and therefore, is a mixture of water from these flow zones. Other than total lithium (described below), none of the metals or general water-quality parameters exceed an EPA MCL or SMCL or PADEP Act 2 drinking water standard. All metals and other inorganic constituents found in groundwater from this well appear to be naturally occurring, and based on the analytical data presented in this report, this well does not appear to be impacted from natural gas drilling or production activities including hydraulic stimulation.

The Piper and Durov diagrams for this well in **Appendix F** indicate the water is of a sodium bicarbonate type. These diagrams confirm that the water quality of the Property Owner F well is consistent between the individual samples of the well, but is also influenced to some extent by water coming from a restricted flow zone as seen by higher proportions of sodium as compared with calcium.

Methane concentrations were relatively high but very stable over the three sampling events (see figure in **Appendix D-7**). The concentrations of dissolved methane were 53.4 mg/L, 55.3 mg/L, and 51.8 mg/L on March 10, 2011, October 25, 2011, and November 11, 2011, respectively. Ethane was not detected (<0.026 mg/L) in the sample collected on March 10, 2011. The

dissolved ethane result for the sample collected on October 25, 2011 was 0.0202 mg/L and the result for the November 11, 2011 sample was 0.202 mg/L. No other light gases were detected in the October 25, 2011 sample. Since the dissolved methane and ethane results have been consistent, the analytical result for ethane in the November 11, 2011 sample is suspected to be an outlier due to laboratory error. The light gases detected in these samples are likely naturally occurring, and, based on the analytical data presented in this report, this well does not appear to be impacted from natural gas drilling or production activities including hydraulic stimulation. In addition, naturally-occurring dissolved methane values >20 mg/L have been detected in 30 of the baseline samples in the Western core area evaluated.

Tests for the presence of *E. coli*, fecal coliform, and total coliform bacteria were negative.

No pesticides, purgeable or extractable petroleum hydrocarbons, DOC, low molecular weight acids, semi-volatile organic compounds, or volatile organic compounds were detected in the October 25, 2011 EPA retrospective split sample. DIC was detected at a concentration of 63.2 mg/L and diethylene and triethylene glycols were not detected in the October 25, 2011 sample. An estimated (J value) detection of tetraethylene glycol, 11J mg/L, was noted in the October 25, 2011 sample. This value is only slightly above the analytical detection limit of 10 mg/L. Due to issues with analytical laboratory blank contamination with several other samples for glycol analyses from this sampling event, there is concern regarding the validity of this result. Chesapeake Energy conducted a review of hydraulic stimulation materials used in this area and has determined that tetraethylene glycol was not used as a hydraulic stimulation additive on well sites in this area. Tetraethylene glycol is utilized in numerous industrial and consumer products. The estimated detection of this compound is believed to be an analytical laboratory contamination issue.

As noted in **Table E-1**, the total lithium result for the November 11, 2011 sample (0.10 mg/L) exceeded the PADEP Act 2 criteria for groundwater of 0.073 mg/L and the EPA regional screening value of 0.031 mg/L. Based on the results from 277 Chesapeake Energy baseline samples collected in the general area of the Property Owner F well, total lithium was detected in 71 (25.6%) of these samples. Total lithium detected in the baseline samples in this area have been found to range between 0.0501 mg/L to 0.398 mg/L (mean 0.12 mg/L, median 0.09 mg/L).

Further, total lithium was found to exceed the EPA regional screening criterion in 25.6 percent of these 277 baseline samples, and in 100 percent of the 71 samples where lithium was detected. Compared to the PADEP Act 2 standard of 0.073 mg/L, 48 of the 71 samples (67.6%) where total lithium was detected exceeded this PADEP standard. Therefore, the total lithium results for the Property Owner F well fall within this area-wide background range. Based on available data, this total lithium value is believed to be naturally occurring and not related to natural gas drilling or production activities including hydraulic stimulation. There were no other exceedances of any other drinking water standard, as noted previously.

6.8 PROPERTY OWNER G (WELL DEPTH UNKNOWN)

The Property Owner G well, depth unknown, is completed in the Devonian-age Catskill Formation in southeastern Bradford County. Analytical results for the Chesapeake Energy baseline parameter list were available for a baseline sample collected on April 2, 2010 from this water well. Analytical results were also available for the more extensive parameters list from the Chesapeake Energy split sample collected on October 27, 2011 in conjunction with the EPA retrospective study. Chesapeake Energy also collected six additional samples from this same well, including one post-treatment sample, and analyzed the samples for the standard Chesapeake Energy baseline analytical parameter list. Analytical results were compared to NURE, NWIS, and Williams 1998 databases for the Catskill Formation and the Chesapeake Energy baseline analytical database for the Central core drilling region.

The analytical results for total barium, chloride, and sodium were relatively consistent for the various sampling events, as can be noted from a review of the figures in **Appendix D-8**, which are time plots of key inorganic parameters and dissolved methane. Time plots show that the concentrations of these parameters are very similar to the baseline sample concentrations collected from this well. The October 1, 2010 and November 10, 2010 samples showed temporary increases in TDS, total iron, and total manganese. The TDS value of 274 mg/L on October 1, 2010 appears to be an outlier. The specific conductance and major ion concentrations are too low to provide for a TDS concentration of 274 mg/L. This is based on: 1) this sample had a similar specific conductance as compared to other samples from this well (specific conductance is proportional to the TDS concentration), and 2) the cation and anion

concentrations for the major geochemistry parameters (calcium, magnesium, sodium, bicarbonate, chloride, and sulfate) are similar for this sample as compared to other samples from this well. Thus, the TDS would be expected to be similar for the October 1, 2010 sampling event.

Total iron continued to be elevated in the June 28, 2011, September 1, 2011, and October 13, 2011 samples. All of these parameters were measured at concentrations similar to baseline concentrations for the last sample event (October 27, 2011). With the exception of the high total iron value on October 1, 2010, the analytical results for this well fall well within the range of concentrations for each of these parameters as compared to the historical background data available from the NURE, NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases for Bradford County. Note that a significant storm event occurred immediately prior to the 10/1/2010 sampling event resulting in 3.9 inches of rainfall. All metals and other inorganic constituents found in groundwater from this well are naturally occurring, and based on the analytical data presented in this report, this well does not appear to be impacted from natural gas drilling, or production activities including hydraulic stimulation. However, there is indication of some variability in water quality during 2010 and 2011 related to the total iron and total manganese concentrations, which was likely due to the presence of sediment in the samples, as the dissolved analyses for manganese and iron are much lower than the total iron values. The key indicator parameters of barium, sodium, chloride, and TDS were stable during this time period, and at very low levels, further suggesting that the variability in total iron and total manganese were related to sediment in the samples. For the October 1, 2010 sampling event, the TSS concentration was measured at 157 mg/L, indicating that the higher levels of total iron and total manganese are likely due to the suspended sediment in those samples.

The metals or general water-quality parameters that were not within the screening criteria include total iron, total lead, total manganese, and turbidity. Turbidity exceeded the EPA MCL on numerous occasions and impacted the metals values discussed in the following paragraphs. Turbidity was measured at <1 NTU (baseline), 24 NTU (November 10, 2010), 91.2 NTU (June 28, 2011), 16.1 NTU (September 1, 2011), 37.1 NTU (October 13, 2011 pretreatment), and 13 NTU (October 27, 2011). Based on the Chesapeake Energy baseline analytical database, 29% of the wells with measureable turbidity exceeded the EPA MCL for turbidity.

Total iron exceeded the most stringent screening criteria of 0.3 mg/L (EPA SMCL) on several occasions, measured at 10.6 mg/L (October 1, 2010), 3.58 mg/L (November 10, 2010), 2.68 mg/L (June 28, 2011), 3.08 mg/L (September 1, 2011), 4.13 mg/L (October 13, 2011 pretreatment), and 0.343 mg/L (October 27, 2011). Dissolved iron was below the screening criteria, measured at <0.05 mg/L (November 10, 2010), 0.109 mg/L (September 1, 2011), 0.0549 mg/L (October 13, 2011 pretreatment), and <0.05 mg/L (October 27, 2011), indicating that iron was present mostly in the suspended solids associated with these samples. Based on the NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases, 40%, 50%, and 38% of the wells with detected iron exceeded the EPA SMCL for iron, respectively.

Total lead was detected once at a concentration above the screening criteria. It was measured at 0.0061 mg/L in the sample collected on October 13, 2011 (pretreatment). This value exceeds the PADEP Act 2 standard of 0.005 mg/L, but is below the EPA action level of 0.015 mg/L. Based on the Williams 1998 and Chesapeake Energy baseline analytical databases, 100% and 97% of the wells, respectively, with detected lead exceeded the PADEP Act 2 value for lead.

Total manganese exceeded the most stringent criterion (EPA SMCL) of 0.05 mg/L for two of the samples. It was detected at 0.153 mg/L (October 1, 2010) and 0.123 mg/L (November 10, 2010). The dissolved manganese concentration was below the quantitation limit, measured at <0.015 mg/L for the November 10, 2010 sample, indicating that manganese was present mostly in the suspended solids associated with this sample. No dissolved analysis for manganese was conducted on the October 1, 2010 sample. Based on the NURE, NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases, 100%, 47%, 50%, and 69% of the wells with detected manganese exceeded the EPA SMCL, respectively.

The Piper and Durov diagrams for this well in **Appendix F** indicate the water is of a calcium bicarbonate type. These diagrams confirm that the water quality of the Property Owner G well is consistent between the individual samples of the well and is also consistent with the background water quality from the NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases for Bradford County.

Methane is the only light gas that has been detected in the well water. Methane has been detected at concentrations of 0.035 mg/L (baseline) and 0.0126 mg/L (September 1, 2011) which

is slightly lower than the baseline value. All other methane values were below the detection limit. This is shown on the methane figure in **Appendix D-8**. The light gases detected in these samples are naturally occurring, and based on the analytical data presented in this report, this well does not appear to be impacted from natural gas drilling or production activities including hydraulic stimulation.

Tests for the presence of *E. coli*, fecal coliform and total coliform bacteria were positive for the one sample analyzed (the EPA retrospective well split sample). The *E. coli* and total coliform were confirmed present and the fecal coliform was measured at 2/100 ml. This is not unusual for rural wells in Pennsylvania as discussed in Section 2. Total coliform was reported to be present in 33% of Pennsylvania rural drinking water wells (Swistock 2009).

No glycols, pesticides, purgeable or extractable petroleum hydrocarbons, DOC, low molecular weight acids, semi-volatile organic compounds, or volatile organic compounds were detected in the October 27, 2011 EPA retrospective split sample. DIC was detected at a concentration of 18.1 mg/L.

6.9 PROPERTY OWNER H (340-FT WELL)

The Property Owner H well is approximately 340 feet in depth and is completed in the Devonian-age Catskill Formation in southeastern Bradford County. Analytical results for the Chesapeake Energy baseline parameter list were available for a baseline sample collected on April 1, 2010 from this water well. Analytical results were also available for the more extensive parameters list from the Chesapeake Energy split sample collected on October 28, 2011 in conjunction with the EPA retrospective study. Chesapeake Energy also collected ten additional samples from this same well, including three post-treatment samples, and analyzed the samples for the standard Chesapeake Energy baseline parameter list. Analytical results were compared to NURE, NWIS, and Williams 1998 databases for the Catskill Formation and the Chesapeake Energy baseline analytical database for the Central core drilling region.

The analytical results for the inorganics, dissolved methane, and total metals were relatively consistent for the various sample events. The October 1, 2010, November 10, 2010, and December 2, 2010 samples showed temporary changes in total iron, total manganese and TDS,

and variability in the sodium concentrations. However, as can be noted from a review of the figures in **Appendix D-9**, which are time plots of key inorganic parameters, the concentrations for total barium, chloride, total manganese, total iron, and TDS were stable otherwise. Time plots show that the concentrations of these parameters are very similar to the baseline sample concentrations collected from this well. The analytical results for this well also fall well within the range of concentrations for each of these parameters as compared to the historical background data available from the NURE, NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases for Bradford County. All metals and other inorganic constituents found in groundwater from this well are naturally occurring, and based on the analytical data presented in this report, this well does not appear to be impacted from natural gas drilling or production activities including hydraulic stimulation. However, there is indication of some variability in water quality during 2010 related to the total iron and total manganese concentrations, which was likely due to the presence of sediment in the samples, as the dissolved analyses for manganese and iron are much lower than the total iron values. The key indicator parameters of barium, sodium, chloride, and TDS were generally stable during this time period, and at very low levels, further suggesting that the variability in total iron and total manganese were related to sediment in the samples.

The metals or general water-quality parameters that were not within the screening criteria include total aluminum, total iron, total lead, total manganese, and turbidity. Turbidity exceeded the EPA MCL on numerous occasions and impacted the metals values discussed in the following paragraphs. Turbidity was measured at 2 NTU (April 2, 2010 - baseline), 31.2 NTU (October 1, 2010), 26.4 NTU (November 10, 2010), 11.7 NTU (December 2, 2010), 7.3 NTU (May 10, 2011 pretreatment), and 6.8 NTU (October 28, 2011). Based on the Chesapeake Energy baseline analytical database, 29% of the wells with measureable turbidity exceeded the EPA MCL for turbidity.

Total aluminum was measured once on October 28, 2011 and exceeded the most stringent screening criterion (EPA SMCL) of 0.2 mg/L. Total aluminum was measured at 0.322 mg/L (October 28, 2011) and dissolved aluminum on this date was below the detection limit of <0.02 mg/L, indicating that the aluminum is associated with the suspended solids in the sample. The

dissolved aluminum is well below the SMCL value. Based on the Williams 1998 database, 67% of the wells located in Catskill formation exceeded the SMCL for aluminum.

Total iron exceeded the most stringent screening criteria of 0.3 mg/L (EPA SMCL) on several occasions, measured at 0.0546 mg/L (April 2, 2010 - baseline), 2.54 mg/L (October 1, 2010), 0.982 mg/L (November 10, 2010), and 0.829 mg/L (December 2, 2010). Dissolved iron was below the screening criteria, measured at <0.05 mg/L on both October 1, 2010 and November 10, 2010, indicating that iron was present mostly in the suspended solids associated with this sample. Note that the highest total iron and total manganese results were detected in the sample collected on 10/1/2010 and a significant storm event occurred immediately prior to that sampling event resulting in 3.9 inches of rainfall. No dissolved metal analyses for iron were conducted on the December 2, 2010 sample. Based on the NWIS, Williams 1998, and Chesapeake Energy baseline databases, 40%, 50%, and 38% of the wells with detected iron exceeded the EPA SMCL for iron, respectively.

Total lead was detected on three occasions at a concentration above the screening criteria. It was measured at 0.0089 mg/L (November 10, 2010), 0.0076 mg/L (March 1, 2011 pretreatment), and 0.0738 mg/L (May 10, 2011 pretreatment). These values exceed the PADEP Act 2 standard of 0.005 mg/L. The November 10, 2010 and March 1, 2011 results were below the EPA Action Level of 0.015 mg/L; however, the May 10, 2011 pretreatment result was above this action level. The November 10, 2010 sample was also analyzed for dissolved lead, which was below the detection limit of <0.005 mg/L. Based on the Williams 1998 and Chesapeake Energy baseline databases, respectively, 100% and 97% of the wells with detected lead exceeded the PADEP Act 2 value for lead.

Total manganese exceeded the most stringent criterion (EPA SMCL) of 0.05 mg/L for three of the samples. It was detected at 0.214 mg/L (October 1, 2010), 0.0607 mg/L (November 10, 2010), and 0.095 mg/L (December 2, 2010). The dissolved manganese concentration was measured at 0.0213 mg/L for the November 10, 2010 sample, indicating that manganese was present mostly in the suspended solids associated with this sample. No analyses for dissolved manganese were conducted on the October 1, 2010 or December 2, 2010 samples. Based on the

NURE, NWIS, Williams 1998, and Chesapeake Energy baseline databases, 100%, 47%, 50%, and 69% of the wells with detected manganese exceeded the EPA SMCL, respectively.

The Piper and Durov diagrams for this well in **Appendix F** indicate the water is of a mixed sodium-calcium bicarbonate type. These diagrams confirm that the water quality of the Property Owner H well is consistent between the individual samples of the well and is also consistent with the background water quality from the NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases for Bradford County.

Methane is the only light gas that has been detected in the well water. Methane has been detected at concentrations of 0.045 mg/L (baseline), 0.0535 mg/L (September 13, 2010), 0.183 mg/L (November 10, 2010), 0.00607 mg/L (October 28, 2011), 0.0655 mg/L (November 8, 2011 pretreatment), and 0.0258 mg/L (November 8, 2011 post-treatment). This is shown on the methane figure in **Appendix D-9**. These detections of methane have been relatively consistent and similar to baseline. The light gases detected in these samples are naturally occurring, and based on the analytical data presented in this report, this well does not appear to be impacted from natural gas drilling and production activities including hydraulic stimulation.

Tests for the presence of total coliform bacteria were positive for the one sample analyzed (the EPA retrospective well split sample). This is not unusual for rural wells in Pennsylvania as discussed in Section 2. Total coliform was reported to be present in 33% of Pennsylvania rural drinking water wells (Swistock 2009). The *E. coli* and fecal coliform were not found.

No pesticides, purgeable or extractable petroleum hydrocarbons, DOC, low molecular weight acids, or semi-volatile organic compounds were detected in the October 28, 2011 EPA retrospective split sample. DIC was detected at a concentration of 17.1 mg/L. Toluene was the only volatile organic compound detected in the sample. It was measured at 1.13 µg/L. Toluene is a common laboratory contaminant and is not generally utilized in hydraulic stimulations. Because toluene was not found in the first three samples and the last sample, it is believed to be a laboratory contaminant.

Tetraethylene and triethylene glycol were the only glycols reported for the October 28, 2011 sample. An estimated (J value) detection of tetraethylene glycol, 20J mg/L, and an estimated

detection of triethylene glycol, 12J mg/L, were noted. The triethylene glycol value is only slightly above the analytical detection limit of 10 mg/L. Due to issues with analytical laboratory blank contamination with several other samples for glycol analyses from this sampling event, there is concern regarding the validity of this result. The estimated detections of these compounds are believed to be an analytical laboratory contamination issue. Chesapeake Energy conducted a review of hydraulic stimulation materials used in this area and has determined that triethylene and tetraethylene glycol were not used as hydraulic stimulation additives on well sites in this area. Glycols are utilized in numerous industrial and consumer products.

6.10 PROPERTY OWNER I (142-FT WELL)

The shallower of the two Property Owner I wells is approximately 142 feet in depth and is completed in the Catskill Formation in southeastern Bradford County. No baseline sample was available for this water well since it fell outside of the baseline sampling radius for Chesapeake natural gas wells. Therefore, evaluation of analytical data from this water well was made by contrasting data from this well with historical databases; review of other parameters such as chloride, TDS, and sodium from this well; and review of the local Chesapeake baseline database surrounding this water well. Analytical results were available for the extensive parameters list from the Chesapeake Energy split sample collected on October 31, 2011 in conjunction with the EPA retrospective study. Chesapeake Energy also collected samples from this same well on August 10, 2010 and September 15, 2010 and analyzed these samples for the standard Chesapeake Energy baseline parameter list. Two additional samples were collected for light gas analysis on October 6, 2010 and October 20, 2010. Analytical results were compared to NURE, NWIS, and Williams 1998 databases for the Catskill Formation and the Chesapeake Energy baseline analytical database for the Central core drilling region.

The analytical results for the inorganics and total metals were consistent between the three sampling events. Total manganese was not detected in these samples. As can be noted from a review of the figures in **Appendix D-10**, which are time plots of key inorganic parameters and dissolved methane, the concentrations for total iron, chloride, TDS, sodium, and total barium were stable over the three sampling events. Time plots show that the concentrations of these parameters are very similar and relatively stable over time. The analytical results for this well

also fall well within the range of concentrations for each of these parameters as compared to the historical background data available from the NURE, NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases for Bradford County. All metals and other inorganic constituents found in groundwater from this well are naturally occurring, and based on the analytical data presented in this report, this well does not appear to be impacted from natural gas drilling or production activities including hydraulic stimulation.

The only metals or general water-quality parameter that was not within the screening criteria was pH. The pH was measured at 6.4 (August 3, 2010) and 6.4 (October 31, 2011). The EPA SMCL for pH is between 6.5 and 8.5 pH units. Note that pH values associated with wells in Bradford County have been observed as low as 6.2 (NURE - Catskill), 6.5 (Williams 1998 - Catskill), and 5.4 (Chesapeake Energy baseline – Central region).

The Piper and Durov diagrams for this well in **Appendix F** indicate the water is of a calcium-bicarbonate type. These diagrams confirm that the water quality of the Property Owner I 142-ft well is consistent between the individual samples of the well and is also consistent with the background water quality from the NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases for Bradford County.

Methane and ethane were the only light gases detected in the samples. Methane was detected at 0.0957 mg/L (August 3, 2010), 1.41 mg/L (September 15, 2010), 2.78 J mg/L (October 6, 2010), and 1.78 mg/L (October 20, 2010). Methane was not detected (<0.005 mg/L) in the last sample date on October 31, 2011. Ethane was detected at 0.0953 mg/L (September 15, 2010), 0.195 mg/L (October 6, 2010), and 0.103 mg/L (October 20, 2010). It was not detected in the August 3, 2010 or the October 31, 2011 sample. This is shown on the methane figure in **Appendix D-10**. These detections of methane have been relatively consistent, and some variability in sample results is expected, as noted earlier. The light gases detected in these samples are likely naturally occurring, and based on the analytical data presented in this report, this well does not appear to be impacted from natural gas drilling or production activities including hydraulic stimulation.

Testing for the presence of total coliform bacteria was positive for the one sample analyzed (the EPA retrospective well split sample). This is not unusual for rural wells in Pennsylvania as

discussed in Section 2. Total coliform was reported to be present in 33% of Pennsylvania rural drinking water wells (Swistock 2009). *E. coli* and fecal coliform testing was negative.

No glycols, pesticides, purgeable or extractable petroleum hydrocarbons, DOC, low molecular weight acids, semi-volatile organic compounds, or volatile organic compounds were detected in the October 31, 2011 EPA retrospective split sample. DIC was detected at a concentration of 19 mg/L.

6.11 PROPERTY OWNER I (203-FT WELL)

The deeper of the two Property Owner I wells is approximately 203 feet in depth and is completed in the Catskill Formation in southeastern Bradford County. Analytical results for the Chesapeake Energy baseline parameter list were available for a baseline sample collected on September 14, 2010 from this water well, shortly after it was drilled. There are no Chesapeake Energy gas wells located within the baseline sampling radius, so upon completion of this water well, a baseline sample was collected. Analytical results were also available for the more extensive parameters list from the Chesapeake Energy split sample collected on October 31, 2011 in conjunction with the EPA retrospective study. Chesapeake Energy also collected an additional seven samples (from 4 sample events) from this same well on November 18, 2010, March 1, 2011 (pretreatment and post-treatment), April 7, 2011 (pretreatment and post-treatment), and May 23, 2011 (pretreatment and post-treatment), and analyzed the samples for the standard Chesapeake Energy baseline analytical parameter list. Seventeen additional samples were collected for light gas analyses during 2010 and 2011. Analytical results were compared to NURE, NWIS, and Williams 1998 databases for the Catskill Formation and the Chesapeake Energy baseline analytical database for the Central core drilling region.

The analytical results for the inorganics, dissolved methane, and total metals were consistent between the six sampling events. As can be noted from a review of the figures in **Appendix D-11**, which are time plots of key inorganic parameters and dissolved methane, the concentrations for total iron, total manganese, chloride, TDS, and total barium were steady or slightly declining over the six sampling events. Time plots show that the concentrations of these parameters are very similar to the baseline sample concentrations collected from this well. Sodium showed a small increase during the sampling time period. However, the analytical results for all of these

parameters fall well within the range of concentrations for each of these parameters as compared to the historical background data available from the NURE, NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases for Bradford County. The analytical data indicates that the detected inorganic parameters are naturally occurring, and based on the analytical data presented in this report, this well does not appear to be impacted from natural gas drilling or production activities including hydraulic stimulation.

The metals or general water-quality parameters that were not below the most stringent screening criteria include total aluminum, total iron, total lead, total manganese, and turbidity. Turbidity exceeded the EPA MCL on numerous occasions and impacted the metals values discussed in the following paragraphs. Turbidity was measured at 68 NTU (baseline), 5.1 NTU (March 1, 2011 pretreatment), 7.2 NTU (March 1, 2011 post-treatment), 12.2 NTU (April 7, 2011 pretreatment), 6.6 NTU (May 23, 2011 pretreatment), and 5.4 NTU (October 31, 2011). Based on the Chesapeake Energy baseline database, 29% of the wells with measureable turbidity exceeded the EPA MCL for turbidity.

Total aluminum was measured once on October 31, 2011 and exceeded the most stringent screening criterion (EPA SMCL) of 0.2 mg/L. Total aluminum was measured at 0.31 mg/L and 0.112 mg/L and dissolved aluminum was not detected (<0.02 mg/L), indicating that most of the aluminum is associated with the suspended solids in the sample. The dissolved aluminum is well below the EPA SMCL value. Based on the Williams 1998 database, 67% of the wells located in Catskill Formation exceeded the EPA SMCL for aluminum.

Total iron exceeded the most stringent screening criteria of 0.3 mg/L (SMCL) on several occasions, measured at 2.29 J mg/L (baseline), 0.434 mg/L (November 18, 2010), 2.18 mg/L (March 1, 2011 pretreatment), and 1.05 mg/L (April 7, 2011 pretreatment). Dissolved iron was below the screening criteria, measured at <0.05 mg/L on September 14, 2010 (baseline) and 0.148 mg/L on November 18, 2010. Based on the NWIS, Williams 1998, and Chesapeake Energy baseline databases, 40%, 50%, and 38% of the wells with detected iron exceeded the EPA SMCL for iron, respectively.

Total lead was detected twice at concentrations above the PADEP Act 2 screening criteria. It was measured at 0.0075 mg/L (April 7, 2011 pretreatment) and 0.0051 mg/L (April 7, 2011 post-

treatment). These values exceed the PADEP Act 2 standard of 0.005 mg/L, but are below the EPA Action Level of 0.015 mg/L. No dissolved lead analyses are available for this sample date. Based on the Williams 1998 and Chesapeake Energy baseline databases, 100% and 97% of the wells with detected lead exceeded the PADEP Act 2 value for lead, respectively.

Total manganese exceeded the most stringent criterion (EPA SMCL) of 0.05 mg/L for three of the samples. It was detected at 0.145 mg/L (March 1, 2011 pretreatment), 0.0992 mg/L (April 7, 2011 pretreatment), and 0.0662 mg/L (May 23, 2011 post-treatment). Total manganese was detected at 0.0429 mg/L in the September 14, 2010 baseline sample with the dissolved manganese concentration measuring 0.0214 mg/L, indicating that manganese was present mostly in the suspended solids associated with this sample. Based on the NURE, NWIS, Williams 1998, and Chesapeake Energy baseline databases, 100%, 47%, 50%, and 69% of the wells with detected manganese exceeded the EPA SMCL, respectively

The Piper and Durov diagrams for this well in **Appendix F** indicate the water is of a mixed sodium-calcium bicarbonate type. These diagrams confirm that the water quality of the Property Owner I 203-ft well is consistent between the individual samples of the well and is also consistent with the background water quality from the NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases for Bradford County.

Methane, ethane, and propane were the only light gases detected in the samples (**Table E-3**). Dissolved methane was detected at 10.9 mg/L (baseline), 25.4 mg/L (October 6, 2010), and 20.6 mg/L (October 13, 2010) before steadily decreasing to 3.6 mg/L (December 7, 2011). This is shown on the methane figure in **Appendix D-11**. Ethane was found at 1.59 mg/L (baseline), 1.84 mg/L (October 6, 2010), and 1.47 mg/L (October 13, 2010), followed by a sharp decline in concentration in subsequent sampling events. Propane was detected in the baseline sample at 0.101 mg/L, and subsequently at levels of 0.117 mg/L (October 6, 2010), 0.0841 mg/L (October 13, 2010), and 0.0388 mg/L (October 20, 2010 post-treatment). As noted previously, it is not uncommon to see variability in methane values due to several factors discussed in earlier sections. The light gases detected in these samples are naturally occurring, and based on the analytical data presented in this report, this well does not appear to be impacted by natural gas drilling or production activities including hydraulic stimulation.

Tests for the presence of *E. coli*, fecal coliform, and total coliform bacteria were negative.

No glycols, pesticides, purgeable or extractable petroleum hydrocarbons, DOC, DIC, low molecular weight acids, or semi-volatile organic compounds were detected in the November 4, 2011 EPA retrospective split sample. Toluene was the only volatile organic compound detected. It was detected at 1.71 µg/L in the March 1, 2011 pretreatment sample, and at 0.95 µg/L in the April 7, 2011 pretreatment sample. Toluene is a common laboratory contaminant and may have been present in materials utilized in the installation of the new well and pump.

6.12 PROPERTY OWNER J (WELL DEPTH UNKNOWN)

The Property Owner J well, depth unknown, is likely completed in the Devonian-age Lock Haven Formation in central Bradford County. Analytical results for the Chesapeake Energy baseline parameter list were available for a baseline sample collected on July 2, 2010 from this water well. Analytical results were also available for the more extensive parameters list from the Chesapeake Energy split sample collected on November 3, 2011 in conjunction with the EPA retrospective study. Chesapeake Energy also collected a sample from this same well on February 8, 2011 and analyzed that sample for the standard Chesapeake Energy baseline analytical parameter list. Analytical results were compared to NURE, NWIS, and Williams 1998 databases for the Lock Haven Formation and the Chesapeake Energy baseline analytical database for the Central core drilling region.

The analytical results for the inorganics, dissolved methane, and total metals were consistent between the three sampling events. As can be noted from a review of the figures in **Appendix D-12**, which are time plots of key inorganic parameters and dissolved methane, the concentrations for total iron, total manganese, chloride, sodium, TDS, and total barium were steady or slightly declining over the three sampling events. Time plots show that the concentrations of these parameters are very similar to the baseline sample concentrations collected from this well. The analytical results for all of these parameters fall well within the range of concentrations for each of these parameters as compared to the historical background data available from the NURE, NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases for Bradford County. All metals and other inorganic constituents found in groundwater from this well are naturally occurring, and based on the analytical data presented in

this report, this well does not appear to be impacted from natural gas drilling or production activities including hydraulic stimulation.

The metals or general water-quality parameters that were not within the screening criteria include total iron, total lead, total manganese, and turbidity. Turbidity exceeded the EPA MCL of 5 NTU on two occasions and may have impacted the metals values discussed in the following paragraphs. Turbidity was measured at 5.7 NTU (baseline) and 9.8 NTU (February 8, 2011). Based on the Chesapeake Energy baseline database, 29% of the wells with measureable turbidity exceeded the EPA MCL for turbidity.

Total iron exceeded the most stringent screening criteria of 0.3 mg/L (SMCL) in the 3 samples collected from this well, measured at 0.676 mg/L (baseline), 0.888 mg/L (February 8, 2011), and 0.583 mg/L (November 3, 2011). Dissolved iron was measured at 0.316 mg/L on November 3, 2011. Based on the NWIS, Williams 1998, and Chesapeake Energy baseline databases, 40%, 50%, and 38% of the wells with detected iron exceeded the EPA SMCL for iron, respectively.

Total lead was detected two times at a concentration above the PADEP Act 2 screening criteria of 0.005 mg/L, but below the EPA Action Level of 0.015 mg/L. It was measured at 0.0114 mg/L (baseline) and 0.009 mg/L (February 8, 2011). Based on the Williams 1998 and Chesapeake Energy baseline databases, respectively, 100% and 97% of the wells with detected lead exceeded the PADEP Act 2 value for lead.

Total manganese exceeded the most stringent criterion (EPA SMCL) of 0.05 mg/L for all three samples. It was detected at 0.249 mg/L (baseline), 0.29 mg/L (February 8, 2011), and 0.22 mg/L (November 3, 2011). The dissolved manganese concentration was measured at 0.216 mg/L for the latter sample. Based on the NURE, NWIS, Williams 1998, and Chesapeake Energy baseline databases, 100%, 47%, 50%, and 69% of the wells with detected manganese exceeded the EPA SMCL, respectively.

The Piper and Durov diagrams for this well in **Appendix F** indicate the water is of a mixed calcium-sodium bicarbonate type. These diagrams confirm that the water quality of the Property Owner J well is consistent between the individual samples of the well and is also consistent with

the background water quality from the NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases for Bradford County.

No light gases were detected in any of the samples.

Tests for the presence of *E. coli*, fecal coliform, and total coliform bacteria were negative.

No glycols, pesticides, purgeable or extractable petroleum hydrocarbons, DOC, low molecular weight acids, volatile organic compounds, or semi-volatile organic compounds were detected in the November 3, 2011 EPA retrospective split sample. DIC was detected at 46.9 mg/L.

6.13 PROPERTY OWNER K (175-FT WELL)

The Property Owner K well is approximately 175 feet in depth and is completed in the Devonian-age Lock Haven Formation in southeastern Bradford County. Analytical results for the Chesapeake Energy baseline parameter list were available for a baseline sample collected on January 7, 2010 from this water well. Analytical results were also available for the more extensive parameters list from the Chesapeake Energy split sample collected on October 27, 2011 in conjunction with the EPA retrospective study. Chesapeake Energy also collected a sample from this same well on May 31, 2011 (post-treatment) and analyzed that sample for the standard Chesapeake Energy baseline analytical parameter list. Analytical results were compared to NURE, NWIS, and Williams 1998 databases for the Lock Haven Formation and the Chesapeake Energy baseline database for the Central core drilling region.

The analytical results for the inorganics, dissolved methane, and total metals were consistent between the two sampling events. As can be noted from a review of the figures in **Appendix D-13**, which are time plots of key inorganic parameters and dissolved methane, the concentrations for total iron, chloride, sodium, TDS, and total barium were steady over the three sampling events. Time plots show that the concentrations of these parameters are very similar to the baseline sample concentrations collected from this well. The total manganese concentration increased slightly from baseline. However, the analytical results for all of these parameters fall well within the range of concentrations for each of these parameters as compared to the historical background data available from the NURE, NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases for Bradford County. All metals and other inorganic constituents

found in groundwater from this well are naturally occurring, and based on the analytical data presented in this report, this well has not been impacted from natural gas drilling or production activities including hydraulic stimulation.

The only metals or general water-quality parameter that was not within the screening criteria was total manganese. Total manganese exceeded the most stringent criterion (EPA SMCL) of 0.05 mg/L for the two samples. It was detected at 0.102 mg/L (May 31, 2011 post-treatment) and 0.168 mg/L (October 27, 2011). The dissolved manganese concentration was measured at 0.119 mg/L for the latter sample, similar to baseline. Based on the NURE, NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases, 96%, 65%, 65%, and 69% of the wells with detected manganese exceeded the EPA SMCL, respectively.

The Piper and Durov diagrams for this well in **Appendix F** indicate the water is of a mixed calcium-sodium bicarbonate type. These diagrams confirm that the water quality of the Property Owner K well is consistent between the individual samples of the well and is also consistent with the background water quality from the NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases for Bradford County.

Methane was the only light gas that was detected in samples from the Property Owner K well. It was measured at 0.00674 mg/L in the October 27, 2011 sample. Methane may have been present in the earlier baseline sample; however, the limit of quantitation for that sample was 0.0260 mg/L. The light gases detected in this sample are naturally occurring, and based on the analytical data presented in this report, this well does not appear to be impacted from natural gas drilling or production activities including hydraulic stimulation.

Testing for the presence of total coliform bacteria was positive for the one sample analyzed (the EPA retrospective well split sample). This is not unusual for rural wells in Pennsylvania as discussed in Section 2. Total coliform was reported to be present in 33% of Pennsylvania rural drinking water wells (Swistock 2009). *E. coli* and fecal coliform testing was negative.

No glycols, pesticides, purgeable or extractable petroleum hydrocarbons, DOC, low molecular weight acids, volatile organic compounds, or semi-volatile organic compounds were detected in the November 3, 2011 EPA retrospective split sample. DIC was detected at 43.7 mg/L.

6.14 PROPERTY OWNER L (225-FT WELL)

The Property Owner L well is approximately 225 feet in depth and is completed in the Devonian-age Lock Haven Formation in central Bradford County. Analytical results for the Chesapeake Energy baseline parameter list were available for a baseline sample collected on April 18, 2010 from this water well. Analytical results were also available for the more extensive parameters list from the Chesapeake Energy split sample collected on November 3, 2011 in conjunction with the EPA retrospective study. Analytical results were compared to NURE, NWIS, and Williams 1998 databases for the Lock Haven Formation and the Chesapeake Energy baseline analytical database for the Central core drilling region.

The analytical results for the inorganics, dissolved methane, and total metals were consistent between the two sampling events. As can be noted from a review of the figures in **Appendix D-14**, which are time plots of key inorganic parameters and dissolved methane, the concentrations for chloride, sodium, TDS, and total barium were steady over the two sampling events. Total iron and total manganese were not detected in either of the samples. Time plots show that the concentrations of these parameters are very similar to the baseline sample concentrations collected from this well. The analytical results for all of these parameters fall well within the range of concentrations for each of these parameters as compared to the historical background data available from the NURE, NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases for Bradford County. All metals and other inorganic constituents found in groundwater from this well are naturally occurring, and based on the analytical data presented in this report, this well does not appear to be impacted from natural gas drilling or production activities including hydraulic stimulation.

All metals and general water-quality parameters were within the screening criteria as listed in **Table E-1**.

The Piper and Durov diagrams for this well in **Appendix F** indicate the water is of a calcium-magnesium bicarbonate type. These diagrams confirm that the water quality of the Property Owner L well is consistent between the individual samples of the well and is also consistent with the background water quality from the NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases for Bradford County.

Methane was the only light gas that was detected in samples from the Property Owner L well. It was measured at 0.048 mg/L in the baseline sample. The methane detected in this sample is naturally occurring, and based on the analytical data presented in this report, this well does not appear to be impacted from natural gas drilling and production activities including hydraulic stimulation.

Testing for the presence of total coliform bacteria was positive for the one sample analyzed (the EPA retrospective well split sample). This is not unusual for rural wells in Pennsylvania as discussed in Section 2. Total coliform was reported to be present in 33% of Pennsylvania rural drinking water wells (Swistock 2009). *E. coli* and fecal coliform testing was negative.

No pesticides, purgeable or extractable petroleum hydrocarbons, DOC, low molecular weight acids, volatile organic compounds, or semi-volatile organic compounds were detected in the November 3, 2011 EPA retrospective split sample. DIC was detected at 38.9 mg/L. Tetraethylene glycol was the only glycol reported for the EPA retrospective split sample. It was reported as an estimated value at 15J mg/L, but was also detected in the laboratory blank. Due to issues with analytical laboratory blank contamination with several other samples for glycol analyses from this sampling event, there is concern regarding the validity of this result. The estimated detection of this compound is believed to be an analytical laboratory contamination issue. To the best of Chesapeake Energy's knowledge, tetraethylene glycol was not utilized in any of the hydraulic stimulation formulations used in the study area. Chesapeake Energy conducted a review of hydraulic stimulation materials used in this area and has determined that tetraethylene glycol was not used as a hydraulic stimulation additive on well sites in this area. Tetraethylene glycol is utilized in numerous industrial and consumer products.

6.15 PROPERTY OWNER M (440-FT WELL)

The Property Owner M well is approximately 440 feet in depth and is completed in the Devonian-age Catskill Formation in southeastern Bradford County. Analytical results for the Chesapeake Energy baseline parameter list were available for a baseline sample collected on January 6, 2010 from this water well. Analytical results were also available for the more extensive parameters list from the Chesapeake Energy split sample collected on October 28, 2011 in conjunction with the EPA retrospective study. Chesapeake Energy also collected two

additional samples: a sample from this same well on December 2, 2010 analyzed for the standard Chesapeake Energy baseline parameter list, and another sample on April 11, 2011 analyzed for total lead. Analytical results were compared to NURE, NWIS, and Williams 1998 databases for the Catskill Formation and the Chesapeake Energy baseline analytical database for the Central core drilling region.

The analytical results for the inorganics, dissolved methane, and total metals were consistent between the four sampling events. As can be noted from a review of the figures in **Appendix D-15**, which are time plots of key inorganic parameters and dissolved methane, the concentrations for total iron, total manganese, chloride, sodium, TDS, and total barium were steady over the four sampling events. Time plots show that the concentrations of these parameters are very similar to the baseline sample concentrations collected from this well. The analytical results for all of these parameters fall well within the range of concentrations for each of these parameters as compared to the historical background data available from the NURE, NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases for Bradford County. All metals and other inorganic constituents found in groundwater from this well are naturally occurring, and based on the analytical data presented in this report, this well does not appear to be impacted from natural gas drilling or production activities including hydraulic stimulation.

All metals and general water-quality parameters were within the screening criteria as listed in **Table E-1** with the exception of total lead. Total lead was detected above the most stringent criteria of 0.005 mg/L (PADEP Act 2) for two of the sampling events, but below the EPA Action Level of 0.015 mg/L. Total lead concentrations of 0.011 mg/L (December 2, 2010) and 0.0124 mg/L (April 11, 2011) were detected. No dissolved lead analysis was conducted on these two samples. Based on the Williams 1998 and Chesapeake Energy baseline databases, respectively, 100% and 97% of the wells with detected lead exceeded the PADEP Act 2 value for lead.

The Piper and Durov diagrams for this well in **Appendix F** indicate the water is of a calcium-magnesium bicarbonate type. These diagrams confirm that the water quality of the Property Owner M well is consistent between the individual samples of the well and is also consistent with the background water quality from the NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases for Bradford County.

No light gases were detected in any of the samples.

Tests for the presence of *E. coli*, fecal coliform, and total coliform bacteria were positive for the one sample analyzed (the EPA retrospective well split sample). The *E. coli* and total coliform were confirmed present and the fecal coliform was measured at 3/100 ml. This is not unusual for rural wells in Pennsylvania as discussed in Section 2. Total coliform was reported to be present in 33% of Pennsylvania rural drinking water wells (Swistock 2009).

No glycols, pesticides, purgeable or extractable petroleum hydrocarbons, DOC, low molecular weight acids, volatile organic compounds, or semi-volatile organic compounds were detected in the October 28, 2011 EPA retrospective split sample. DIC was detected at 34.6 mg/L.

7. CONCLUSIONS

Based upon review of the analytical data for each of the 14 water wells and one spring presented in this report, and subsequent comparison of these results with regional historical and baseline water-quality databases, this study concludes that these fifteen water sources do not appear to be impacted by natural gas drilling or production activities including hydraulic stimulation. A summary of conclusions for these water sources is included in **Table 7-1**.

With the few exceptions noted herein, there are no significant increases in inorganic parameters when comparing current analyses with baseline conditions or from historical databases. None of the wells show significant increases in dissolved methane when comparing current analyses with baseline conditions or area-wide baseline databases. Note that the Property Owner A, Property Owner I (142-feet), and Property Owner F wells showed levels of methane that could not be compared to baseline methane concentrations due to the absence of baseline samples. Therefore, methane data from those wells were compared to the Chesapeake Energy baseline databases. There were also a few detections of organic compounds in some of the wells, but these are not attributable to natural gas drilling, or production activities including hydraulic stimulation. The analyses for each of the fifteen water sources demonstrated that most of the individual parameters fell within the ranges and were similar to the mean concentrations for the NURE, NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases for selected areas in Bradford County (and selected areas in western Susquehanna County for the Chesapeake Energy baseline database).

The Property Owner A water well was possibly over-stressed during the EPA retrospective sampling or purging activities, resulting in very high turbidity levels. Review of the field notes indicate that the turbidity changed or increased with time of pumping. The Property Owner I 203-ft well has demonstrated a slight increase in sodium from baseline sample results; however, the sodium level remains low and stable, indicating that it is naturally occurring. The Property Owner K well has demonstrated a slight increase in total manganese from baseline conditions; however, the total manganese level is below typical values for the formation, indicating that it is naturally occurring.

Table 7-1

Summary of Conclusions for EPA Study Wells

Water Source	Inorganics Observations	Dissolved Methane Observations	Regional Comparison	Conclusion
Property Owner A	Total iron and total manganese concentrations are variable and the variability is partly due to excessive sediment in the samples. Sodium declined slightly with time. Barium, chloride, and TDS were relatively stable with time.	Baseline sampling was not completed for this well. Methane concentration declined significantly during the sampling period.	Total manganese and total iron results are somewhat higher than the historical background data mean values available from the NURE, NWIS, Williams 1998, and Chesapeake Energy baseline analytical databases, likely due to high sediment content in samples. Barium, sodium, chloride, and TDS mostly fall within documented ranges in NURE, NWIS, Williams 1998, and Chesapeake Energy analytical databases.	Baseline sampling was not completed for this well. Based on the analytical data presented in this report water well does not appear to be impacted by natural gas drilling and production activities including hydraulic stimulation.
Property Owner B (spring)	No significant increases or decreases from baseline are observed.	No methane has been observed.	Parameters fall within documented ranges in NURE, NWIS, Williams 1998, and Chesapeake Energy analytical databases.	Based on the analytical data presented in this report, spring does not appear to be impacted by natural gas drilling and production activities including hydraulic stimulation.

Table 7-1 (Cont.)

Summary of Conclusions for EPA Study Wells

Water Source	Inorganics Observations	Dissolved Methane Observations	Regional Comparison	Conclusion
Property Owner C	No significant increases from baseline are observed. Slight decreases from baseline observed for barium, chloride, manganese, TDS, and sodium. Groundwater is from restricted flow zone.	No significant increase or change from baseline is observed.	Parameters generally fall within documented ranges in NURE, NWIS, Williams 1998, and Chesapeake Energy analytical databases. Sodium and chloride fall outside the NURE range due to well location within restricted flow zone.	Based on the analytical data presented in this report, water well does not appear to be impacted by natural gas drilling and production activities including hydraulic stimulation.
Property Owner D	No significant increases from baseline are observed. Slight decrease in sodium observed.	No significant increase or change from baseline is observed.	Parameters fall within documented ranges in NURE, NWIS, Williams 1998, and Chesapeake Energy analytical databases.	Based on the analytical data presented in this report, water well does not appear to be impacted by natural gas drilling and production activities including hydraulic stimulation.
Property Owner E (115-ft well)	No significant increases or decreases from baseline are observed.	Slight but insignificant increase from baseline is observed.	Parameters fall within documented ranges in NURE, NWIS, Williams 1998, and Chesapeake Energy analytical databases.	Based on the analytical data presented in this report, water well does not appear to be impacted by natural gas drilling and production activities including hydraulic stimulation.

Table 7-1 (Cont.)

Summary of Conclusions for EPA Study Wells

Water Source	Inorganics Observations	Dissolved Methane Observations	Regional Comparison	Conclusion
Property Owner E (185-ft well)	No significant increases from baseline are observed. Slight decreases from baseline are noted for sodium, TDS, and manganese.	Methane declined significantly from baseline to current conditions.	Parameters fall within documented ranges in NURE, NWIS, Williams 1998, and Chesapeake Energy analytical databases.	Based on the analytical data presented in this report, water well does not appear to be impacted by natural gas drilling or production activities including hydraulic stimulation.
Property Owner F	All parameters are stable and no significant increases or decreases are noted in the data. Well likely completed in both the restricted flow zone and unrestricted flow zone as evidenced by higher sodium and chloride levels found in this well.	Baseline sampling was not completed for this well. Methane concentration remained high and constant, during the sampling period.	Parameters generally fall within documented ranges in NURE, NWIS, Williams 1998, and Chesapeake Energy analytical databases. Barium concentrations exceed the range in the Williams 1998 database for unrestricted flow zone.	Baseline sampling was not completed for this well. Based on the analytical data presented in this report, it does not appear that this water well was impacted by natural gas drilling and production activities including hydraulic stimulation.
Property Owner G	Total iron and total manganese concentrations are variable and the variability is due to excessive sediment in the samples. A significant storm event occurred immediately prior to the 10/1/2010 sampling event resulting in 3.9 inches rainfall. Note that the TDS value of 274 mg/L on October 1, 2010 is considered an outlier.	No significant increase or change from baseline is observed.	Parameters generally fall within documented ranges in NURE, NWIS, Williams 1998, and Chesapeake Energy analytical databases. The iron concentration from the October 1, 2010 sample was higher than the ranges of the NWIS and Williams 1998 data, but likely due to sediment in sample.	Based on the analytical available data presented in this report, water well does not appear to be impacted by natural gas drilling and production activities including hydraulic stimulation.

Table 7-1 (Cont.)

Summary of Conclusions for EPA Study Wells

Water Source	Inorganics Observations	Dissolved Methane Observations	Regional Comparison	Conclusion
Property Owner H	Total iron and total manganese concentrations are variable and the variability is due to excessive sediment in the samples. A significant storm event occurred immediately prior to the 10/1/2010 sampling event resulting in 3.9 inches rainfall. Sodium has fluctuated during the various sampling events, but is currently at a slightly lower concentration than baseline.	No significant increase or change from baseline is observed.	Parameters fall within documented ranges in NURE, NWIS, Williams 1998, and Chesapeake Energy analytical databases.	Based on the analytical data presented in this report, water well does not appear to be impacted by natural gas drilling and production activities including hydraulic stimulation.
Property Owner I (142-ft well)	Some minor variability in analytical data but no significant increases are observed.	Baseline sampling was not completed for this well. Slight variability in methane values observed, however no significant increase is observed.	Parameters fall within documented ranges in NURE, NWIS, Williams 1998, and Chesapeake Energy analytical databases.	Baseline sampling was not completed for this well. Based on the analytical data presented in this report, water well does not appear to be impacted by natural gas drilling and production activities including hydraulic stimulation.

Table 7-1 (Cont.)

Summary of Conclusions for EPA Study Wells

Water Source	Inorganics Observations	Dissolved Methane Observations	Regional Comparison	Conclusion
Property Owner I (203-ft well)	Total iron and total manganese concentrations are variable and the variability is due to excessive sediment in the samples. Sodium has shown a small increase in concentration from baseline to current conditions. However, the sodium level remains low and stable. Chloride levels have show a small decrease from baseline, but are also stable.	Methane is variable but overall has declined slightly from baseline to current conditions.	Parameters fall within documented ranges in NURE, NWIS, Williams 1998, and Chesapeake Energy analytical databases.	Based on the analytical data presented in this report, water well does not appear to be impacted by natural gas drilling and production activities including hydraulic stimulation.
Property Owner J	No significant increases from baseline are observed. Sodium, chloride, and TDS declined from baseline.	No significant increase or change from baseline is observed.	Parameters fall within documented ranges in NURE, NWIS, Williams 1998, and Chesapeake Energy analytical databases.	Based on the analytical data presented in this report, water well is not impacted by natural gas drilling or production activities including hydraulic stimulation
Property Owner K	No significant increases or decreases from baseline are observed. Total manganese concentrations are variable and the variability is due to excessive sediment in the samples, Dissolved result similar to baseline.	No significant increase or change from baseline is observed.	Parameters fall within documented ranges in NURE, NWIS, Williams 1998, and Chesapeake Energy analytical databases.	Based on the analytical data presented in this report, water well does not appear to be impacted by natural gas drilling and production activities including hydraulic stimulation.

Table 7-1 (Cont.)

Summary of Conclusions for EPA Study Wells

Water Source	Inorganics Observations	Dissolved Methane Observations	Regional Comparison	Conclusion
Property Owner L	No significant increases or decreases from baseline are observed.	Slight but insignificant decrease from baseline is observed.	Parameters fall within documented ranges in NURE, NWIS, Williams 1998, and Chesapeake Energy analytical databases.	Based on the analytical data presented in this report, water well does not appear to be impacted by natural gas drilling and production activities including hydraulic stimulation.
Property Owner M	No significant increases or decreases from baseline are observed.	No significant increase or change from baseline is observed.	Parameters fall within documented ranges in NURE, NWIS, Williams 1998, and Chesapeake Energy analytical databases.	Based on the analytical data presented in this report, water well does not appear to be impacted by natural gas drilling and production activities including hydraulic stimulation.

APPENDIX A
EPA STUDY WELLS

APPENDIX A-1
EPA STUDY WELL DATA
PROPERTY OWNER A

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER A

Property Owner		PROPERTY OWNER A	PROPERTY OWNER A	PROPERTY OWNER A	PROPERTY OWNER A	PROPERTY OWNER A	PROPERTY OWNER A
Location Description		ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL
Source Type		WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		300	300	300	300	300	300
Sampled Before Treatment?		Pre-Treatment	NA	NA	NA	NA	NA
Sample ID		1013201000201	0718201120201	0804201122804	0818201120203	0901201120201	1104201120202
Parameter and units	Sample Date	10/13/2010	7/18/2011	8/4/2011	8/18/2011	9/1/2011	11/4/2011
Aldehydes							
Gluteraldehyde	UG/L	---	---	---	---	---	---
Bacteria							
E. coli	colonies/100ml	---	---	---	---	---	Absent
Fecal coliform bacteria	colonies/100ml	---	---	---	---	---	Present
Total Coliform Bacteria	colonies/100ml	---	---	---	---	---	Present
DBCP							
1,2-Dibromo-3-chloropropane	UG/L	---	---	---	---	---	< 0.1003 U
Extractable Petroleum Hydrocarbons							
Diesel	UG/L	---	---	---	---	---	< 95.2 U
General Chemistry							
Alkalinity, Total (CaCO3)	MG/L	---	---	---	---	---	118
Ammonia as N	MG/L	---	---	---	---	---	1.32
Bicarbonate Alkalinity as CaCO3	MG/L	108	101	---	---	---	118
Bromide	MG/L	---	---	---	---	---	< 2.5 U
Carbonate as CaCO3	MG/L	< 10.0 U	< 10.0 U	---	---	---	< 10.0 U
Chloride	MG/L	10.2	< 5.00 U	---	---	---	6.3
CO2 by Headspace	UG/L	---	---	---	---	---	< 12000 U
Cyanide	MG/L	---	---	---	---	---	---
Fluoride	MG/L	---	---	---	---	---	< 0.50 U
MBAS	MG/L	< 0.0500 U	< 0.0500 U	---	---	---	< 0.12 U
Nitrate	MG/L	---	---	---	---	---	---
Nitrate Nitrogen	MG/L	---	---	---	---	---	< 0.50 U
Nitrite Nitrogen	MG/L	---	---	---	---	---	< 0.50 U
Oil & Grease HEM	MG/L	< 6.85 U	< 6.33 U	---	---	---	< 4.71 U
pH	pH UNITS	7.20 J	7.10 H	---	---	---	6.80 H
Phosphorus	MG/L	---	---	---	---	---	0.249
Specific conductance	UMHO/CM	230	251	---	---	---	255
Sulfate	MG/L	15.3	15.3	---	---	---	14
Temperature of pH determination	CELSIUS	21.4 J	21.3 H	---	---	---	22.0 H
Total Dissolved Solids	MG/L	145	142	---	---	---	157
Total Suspended Solids	MG/L	123 J	144	---	---	---	1430, 312 H
Turbidity	NTU	33	36	---	---	---	865
Glycols							
1,2-Propylene Glycol	MG/L	---	---	---	---	---	---
Diethylene Glycol	MG/L	---	---	---	---	---	< 10 U
Ethylene Glycol	MG/L	---	---	---	---	---	---
Tetraethylene glycol	MG/L	---	---	---	---	---	< 10 UJ
Triethylene glycol	MG/L	---	---	---	---	---	< 10 U
Light Gases							
Acetylene	MG/L	---	---	---	---	---	< 0.00500 U
Ethane	MG/L	0.192	0.0861	0.0904	0.0964	0.0556	0.0117
Ethene	MG/L	---	---	---	---	---	< 0.00500 U
Methane	MG/L	8.36	5.21	4.82	4.95	1.51	1.86
n-Butane	MG/L	---	---	---	---	---	< 0.00500 U
Propane	MG/L	< 0.0340 U	< 0.0340 U	< 0.0340 U	< 0.0340 U	< 0.00500 U	< 0.00500 U
Low Molecular Weight Acids							
Acetic Acid	UG/L	---	---	---	---	---	< 10000 U
Butyric Acid	UG/L	---	---	---	---	---	< 10000 U
Formic Acid	UG/L	---	---	---	---	---	< 10000 U
Isobutyric acid	UG/L	---	---	---	---	---	< 10000 U
Lactic acid	UG/L	---	---	---	---	---	< 5000 U
Propionic Acid	UG/L	---	---	---	---	---	< 13000 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER A

Property Owner		PROPERTY OWNER A	PROPERTY OWNER A	PROPERTY OWNER A	PROPERTY OWNER A	PROPERTY OWNER A	PROPERTY OWNER A
Location Description		ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL
Source Type		WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		300	300	300	300	300	300
Sampled Before Treatment?		Pre-Treatment	NA	NA	NA	NA	NA
Sample ID		1013201000201	0718201120201	0804201122804	0818201120203	0901201120201	1104201120202
Parameter and units	Sample Date	10/13/2010	7/18/2011	8/4/2011	8/18/2011	9/1/2011	11/4/2011
Metals, 6020x							
Cesium	MG/L	---	---	---	---	---	< 0.1 U
Cesium, Dissolved	MG/L	---	---	---	---	---	< 0.1 U
Potassium	MG/L	---	---	---	---	---	< 100 U
Potassium, Dissolved	MG/L	---	---	---	---	---	< 100 U
Silicon	MG/L	---	---	---	---	---	< 12500 U
Silicon, Dissolved	MG/L	---	---	---	---	---	< 2500 U
Thorium	MG/L	---	---	---	---	---	< 2 U
Thorium, Dissolved	MG/L	---	---	---	---	---	< 2 U
Uranium	MG/L	---	---	---	---	---	< 1 U
Uranium, Dissolved	MG/L	---	---	---	---	---	< 1 U
Metals, Total							
Aluminum	MG/L	---	---	---	---	---	1.44, 6.26
Antimony	MG/L	---	---	---	---	---	< 0.00200 U
Arsenic	MG/L	0.01	< 0.0100 U	---	---	---	0.0122
Barium	MG/L	0.388	0.262	---	---	---	0.616
Beryllium	MG/L	---	---	---	---	---	< 0.00200 U
Boron	MG/L	---	---	---	---	---	0.055
Cadmium	MG/L	< 0.00100 U	< 0.00100 U	---	---	---	< 0.00100 U
Calcium	MG/L	24.5	26.9	---	---	---	24.6
Chromium	MG/L	< 0.00500 U	< 0.00500 U	---	---	---	0.00247
Cobalt	MG/L	---	---	---	---	---	0.00922
Copper	MG/L	---	---	---	---	---	0.0486
Hardness, CaCO3	MG/L	---	---	---	---	---	---
Iron	MG/L	6.19	0.786	---	---	---	3.88, 14.5
Lead	MG/L	< 0.00500 U	< 0.00500 U	---	---	---	0.0353, 0.0377
Lithium	MG/L	---	---	---	---	---	---
Magnesium	MG/L	5.18	5.19	---	---	---	6.7
Manganese	MG/L	0.369	0.912	---	---	---	1.15, 1.34
Mercury	MG/L	< 0.000200 U	< 0.000200 U	---	---	---	< 0.000200 U
Molybdenum	MG/L	---	---	---	---	---	< 0.00500 U
Nickel	MG/L	---	---	---	---	---	0.0137
Potassium	MG/L	2.25	1.74	---	---	---	1.83
Selenium	MG/L	< 0.0100 U	< 0.0100 U	---	---	---	< 0.00200 U
Silver	MG/L	< 0.00500 U	< 0.00500 U	---	---	---	< 0.00200 U
Sodium	MG/L	35.3	17.3	---	---	---	19.6
Strontium	MG/L	---	0.657	---	---	---	0.641
Sulfur	MG/L	10	4.44	---	---	---	3.82
Thallium	MG/L	---	---	---	---	---	< 0.00200 U
Titanium	MG/L	---	---	---	---	---	0.00415
Vanadium	MG/L	---	---	---	---	---	0.00451
Zinc	MG/L	---	---	---	---	---	0.0616
Metals, Dissolved							
Aluminum, Dissolved	MG/L	---	---	---	---	---	0.0566
Antimony, Dissolved	MG/L	---	---	---	---	---	< 0.00200 U
Arsenic, Dissolved	MG/L	---	---	---	---	---	0.00416
Barium, Dissolved	MG/L	---	0.234	---	---	---	0.354
Beryllium, Dissolved	MG/L	---	---	---	---	---	< 0.00200 U
Boron, Dissolved	MG/L	---	---	---	---	---	0.0671
Cadmium, Dissolved	MG/L	---	---	---	---	---	< 0.00100 U
Calcium, Dissolved	MG/L	---	27.5	---	---	---	24.4
Chromium, Dissolved	MG/L	---	---	---	---	---	< 0.00200 U
Cobalt, Dissolved	MG/L	---	---	---	---	---	< 0.00200 U
Copper, Dissolved	MG/L	---	---	---	---	---	< 0.00500 U
Iron, Dissolved	MG/L	---	< 0.0500 U	---	---	---	0.0845
Lead, Dissolved	MG/L	---	---	---	---	---	< 0.00200 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER A

Property Owner		PROPERTY OWNER A	PROPERTY OWNER A	PROPERTY OWNER A	PROPERTY OWNER A	PROPERTY OWNER A	PROPERTY OWNER A
Location Description		ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL
Source Type		WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		300	300	300	300	300	300
Sampled Before Treatment?		Pre-Treatment	NA	NA	NA	NA	NA
Sample ID		1013201000201	0718201120201	0804201122804	0818201120203	0901201120201	1104201120202
Parameter and units	Sample Date	10/13/2010	7/18/2011	8/4/2011	8/18/2011	9/1/2011	11/4/2011
Magnesium, Dissolved	MG/L	---	5.25	---	---	---	4.9
Manganese, Dissolved	MG/L	---	0.788	---	---	---	0.959, 1.02,1.03
Mercury, Dissolved	MG/L	---	---	---	---	---	< 0.000200 U
Molybdenum, Dissolved	MG/L	---	---	---	---	---	0.00578
Nickel, Dissolved	MG/L	---	---	---	---	---	< 0.00500 U
Potassium, Dissolved	MG/L	---	1.53	---	---	---	1.51
Selenium, Dissolved	MG/L	---	---	---	---	---	< 0.00200 U
Silver, Dissolved	MG/L	---	---	---	---	---	< 0.00200 U
Sodium, Dissolved	MG/L	---	18.2	---	---	---	23.8
Strontium, Dissolved	MG/L	---	0.671	---	---	---	0.665
Sulfur, Dissolved	MG/L	---	---	---	---	---	3.77
Thallium, Dissolved	MG/L	---	---	---	---	---	< 0.00200 U
Titanium, Dissolved	MG/L	---	---	---	---	---	0.00294
Vanadium, Dissolved	MG/L	---	---	---	---	---	< 0.00400 U
Zinc, Dissolved	MG/L	---	---	---	---	---	< 0.0500 U
Miscellaneous Organics							
Inorganic Carbon, Dissolved	MG/L	---	---	---	---	---	25.9
Organic Carbon, Dissolved	MG/L	---	---	---	---	---	< 1.00 U
Pesticides and PCBs							
4,4'-DDD	UG/L	---	---	---	---	---	< 0.0238 U
4,4'-DDE	UG/L	---	---	---	---	---	< 0.0238 U
4,4'-DDT	UG/L	---	---	---	---	---	< 0.0238 U
Aldrin	UG/L	---	---	---	---	---	< 0.0238 U
alpha-BHC	UG/L	---	---	---	---	---	< 0.0238 U
Azinphos-methyl	UG/L	---	---	---	---	---	< 0.95 U
beta-BHC	UG/L	---	---	---	---	---	< 0.0238 U
Carbaryl	UG/L	---	---	---	---	---	< 6.0 U
delta-BHC	UG/L	---	---	---	---	---	< 0.0238 U
Dichlorvos	UG/L	---	---	---	---	---	< 0.95 U
Dieldrin	UG/L	---	---	---	---	---	< 0.0238 U
Disulfoton	UG/L	---	---	---	---	---	< 0.95 U
Endosulfan I	UG/L	---	---	---	---	---	< 0.0238 U
Endosulfan II	UG/L	---	---	---	---	---	< 0.0238 U
Endosulfan sulfate	UG/L	---	---	---	---	---	< 0.0238 U
Endrin	UG/L	---	---	---	---	---	< 0.0238 U
Endrin aldehyde	UG/L	---	---	---	---	---	< 0.0238 U
Endrin ketone	UG/L	---	---	---	---	---	< 0.0238 U
gamma-BHC (Lindane)	UG/L	---	---	---	---	---	< 0.0238 U
Heptachlor	UG/L	---	---	---	---	---	< 0.0238 U
Heptachlor epoxide	UG/L	---	---	---	---	---	< 0.0238 U
Malathion	UG/L	---	---	---	---	---	< 0.95 U
Methoxychlor	UG/L	---	---	---	---	---	< 0.0238 U
Mevinphos	UG/L	---	---	---	---	---	< 0.95 U
Purgeable Petroleum Hydrocarbons							
GRO as Gasoline	UG/L	---	---	---	---	---	< 100 U
Semivolatile Organics							
1,2,4,5-Tetrachlorobenzene	UG/L	---	---	---	---	---	< 0.9 U
1,2-Dinitrobenzene	UG/L	---	---	---	---	---	< 5 U
1,2-Diphenylhydrazine	UG/L	---	---	---	---	---	< 0.9 U
1,3-Dimethyl adamatane	UG/L	---	---	---	---	---	< 5 U
1,3-Dinitrobenzene	UG/L	---	---	---	---	---	< 5 U
1,4-Dinitrobenzene	UG/L	---	---	---	---	---	< 5 U
1-Chloronaphthalene	UG/L	---	---	---	---	---	< 0.9 U
2,3,4,6-Tetrachlorophenol	UG/L	---	---	---	---	---	< 0.9 U
2,4,5-Trichlorophenol	UG/L	---	---	---	---	---	< 0.9 U
2,4,6-Trichlorophenol	UG/L	---	---	---	---	---	< 0.9 U
2,4-Dichlorophenol	UG/L	---	---	---	---	---	< 0.9 U
2,4-Dimethylphenol	UG/L	---	---	---	---	---	< 0.9 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER A

Property Owner		PROPERTY OWNER A	PROPERTY OWNER A	PROPERTY OWNER A	PROPERTY OWNER A	PROPERTY OWNER A	PROPERTY OWNER A
Location Description		ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL
Source Type		WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		300	300	300	300	300	300
Sampled Before Treatment?		Pre-Treatment	NA	NA	NA	NA	NA
Sample ID		1013201000201	0718201120201	0804201122804	0818201120203	0901201120201	1104201120202
Parameter and units	Sample Date	10/13/2010	7/18/2011	8/4/2011	8/18/2011	9/1/2011	11/4/2011
2,4-Dinitrophenol	UG/L	---	---	---	---	---	< 28 U
2,4-Dinitrotoluene	UG/L	---	---	---	---	---	< 5 U
2,6-Dichlorophenol	UG/L	---	---	---	---	---	< 0.9 U
2,6-Dinitrotoluene	UG/L	---	---	---	---	---	< 0.9 U
2-Butoxyethanol	UG/L	---	---	---	---	---	< 5 UJ
2-Chloronaphthalene	UG/L	---	---	---	---	---	< 0.9 U
2-Chlorophenol	UG/L	---	---	---	---	---	< 0.9 U
2-Methylnaphthalene	UG/L	---	---	---	---	---	< 0.5 U
2-Methylphenol	UG/L	---	---	---	---	---	< 0.9 U
2-Nitroaniline	UG/L	---	---	---	---	---	< 0.9 U
2-Nitrophenol	UG/L	---	---	---	---	---	< 0.9 U
3,3-Dichlorobenzidine	UG/L	---	---	---	---	---	< 5 U
3-Nitroaniline	UG/L	---	---	---	---	---	< 0.9 U
4,4'-Methylenebis(2-chloroaniline)	UG/L	---	---	---	---	---	< 14 UJ
4,4'-Methylenebis(N,N-dimethylanilin	UG/L	---	---	---	---	---	< 14 UJ
4,6-Dinitro-2-methylphenol	UG/L	---	---	---	---	---	< 14 U
4-Bromophenyl phenyl ether	UG/L	---	---	---	---	---	< 0.9 U
4-Chloro-3-methylphenol	UG/L	---	---	---	---	---	< 0.9 UJ
4-Chloroaniline	UG/L	---	---	---	---	---	< 0.9 U
4-Chlorophenyl phenyl ether	UG/L	---	---	---	---	---	< 0.9 U
4-Methylphenol	UG/L	---	---	---	---	---	< 0.9 U
4-Nitroaniline	UG/L	---	---	---	---	---	< 0.9 U
4-Nitrophenol	UG/L	---	---	---	---	---	< 28 U
Acenaphthene	UG/L	---	---	---	---	---	< 0.5 U
Acenaphthylene	UG/L	---	---	---	---	---	< 0.5 U
Acetophenone	UG/L	---	---	---	---	---	< 0.9 U
Adamantane	UG/L	---	---	---	---	---	< 5 U
Aniline	UG/L	---	---	---	---	---	< 0.9 U
Anthracene	UG/L	---	---	---	---	---	< 0.5 U
Benzo (a) anthracene	UG/L	---	---	---	---	---	< 0.5 UJ
Benzo (a) pyrene	UG/L	---	---	---	---	---	< 0.5 U
Benzo (b) fluoranthene	UG/L	---	---	---	---	---	< 0.5 U
Benzo (g,h,i) perylene	UG/L	---	---	---	---	---	< 0.5 U
Benzo (k) fluoranthene	UG/L	---	---	---	---	---	< 0.5 U
Benzoic acid	UG/L	---	---	---	---	---	< 14 UJ
Benzyl alcohol	UG/L	---	---	---	---	---	< 14 U
Bis(2-chloroethoxy)methane	UG/L	---	---	---	---	---	< 0.9 U
Bis(2-chloroethyl)ether	UG/L	---	---	---	---	---	< 0.9 U
bis(2-Chloroisopropyl)ether	UG/L	---	---	---	---	---	< 0.9 U
Bis(2-ethylhexyl)phthalate	UG/L	---	---	---	---	---	< 5 UJ
Butyl benzyl phthalate	UG/L	---	---	---	---	---	< 5 UJ
Carbazole	UG/L	---	---	---	---	---	< 0.9 U
Chlorobenzilate	UG/L	---	---	---	---	---	< 9 U
Chrysene	UG/L	---	---	---	---	---	< 0.5 UJ
Diallate (cis or trans)	UG/L	---	---	---	---	---	< 5 U
Dibenz (a,h) anthracene	UG/L	---	---	---	---	---	< 0.5 U
Dibenzofuran	UG/L	---	---	---	---	---	< 0.9 U
Diethyl phthalate	UG/L	---	---	---	---	---	< 5 U
Dimethyl phthalate	UG/L	---	---	---	---	---	< 5 U
Di-n-butyl phthalate	UG/L	---	---	---	---	---	< 5 U
Di-n-octyl phthalate	UG/L	---	---	---	---	---	< 5 U
Dinoseb	UG/L	---	---	---	---	---	< 5 U
Disulfoton	UG/L	---	---	---	---	---	< 47 U
d-Limonene	UG/L	---	---	---	---	---	< 5 U
Fluoranthene	UG/L	---	---	---	---	---	< 0.5 U
Fluorene	UG/L	---	---	---	---	---	< 0.5 U
Hexachlorobenzene	UG/L	---	---	---	---	---	< 0.5 U
Hexachlorobutadiene	UG/L	---	---	---	---	---	< 0.9 U
Hexachlorocyclopentadiene	UG/L	---	---	---	---	---	< 14 U
Hexachloroethane	UG/L	---	---	---	---	---	< 5 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER A

Property Owner		PROPERTY OWNER A	PROPERTY OWNER A	PROPERTY OWNER A	PROPERTY OWNER A	PROPERTY OWNER A	PROPERTY OWNER A
Location Description		ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL
Source Type		WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		300	300	300	300	300	300
Sampled Before Treatment?		Pre-Treatment	NA	NA	NA	NA	NA
Sample ID		1013201000201	0718201120201	0804201122804	0818201120203	0901201120201	1104201120202
Parameter and units	Sample Date	10/13/2010	7/18/2011	8/4/2011	8/18/2011	9/1/2011	11/4/2011
Indeno (1,2,3-cd) pyrene	UG/L	---	---	---	---	---	< 0.5 U
Isophorone	UG/L	---	---	---	---	---	< 0.9 U
Naphthalene	UG/L	---	---	---	---	---	< 0.5 U
Nitrobenzene	UG/L	---	---	---	---	---	< 0.9 U
N-Nitrosodiethylamine	UG/L	---	---	---	---	---	< 0.9 U
N-Nitrosodimethylamine	UG/L	---	---	---	---	---	< 5 U
N-Nitrosodi-n-butylamine	UG/L	---	---	---	---	---	< 5 U
N-Nitrosodi-n-propylamine	UG/L	---	---	---	---	---	< 0.9 U
N-Nitrosodiphenylamine	UG/L	---	---	---	---	---	< 0.9 U
N-Nitrosomethylethylamine	UG/L	---	---	---	---	---	< 5 U
Parathion-ethyl	UG/L	---	---	---	---	---	< 5 U
Parathion-methyl	UG/L	---	---	---	---	---	< 5 U
Pentachlorobenzene	UG/L	---	---	---	---	---	< 0.9 U
Pentachlorophenol	UG/L	---	---	---	---	---	< 5 U
Phenanthrene	UG/L	---	---	---	---	---	< 0.5 U
Phenol	UG/L	---	---	---	---	---	< 0.9 U
Phorate	UG/L	---	---	---	---	---	< 0.9 U
Pronamide	UG/L	---	---	---	---	---	< 0.9 U
Pyrene	UG/L	---	---	---	---	---	< 0.5 U
Pyridine	UG/L	---	---	---	---	---	< 5 U
Squalene	UG/L	---	---	---	---	---	6 J
Terbufos	UG/L	---	---	---	---	---	< 5 UJ
Terpineol	UG/L	---	---	---	---	---	< 5 U
Tributoxyethyl phosphate	UG/L	---	---	---	---	---	< 5 U
Trifluralin	UG/L	---	---	---	---	---	< 5 UJ
TICs							
1,2,3-Trimethylbenzene	UG/L	---	---	---	---	---	---
Volatile Organics							
1,1,1-Trichloroethane	UG/L	---	---	---	---	---	< 1.00 U
1,1,2-Trichloroethane	UG/L	---	---	---	---	---	< 1.00 U
1,1-Dichloroethane	UG/L	---	---	---	---	---	< 1.00 U
1,1-Dichloroethene	UG/L	---	---	---	---	---	< 1.00 U
1,2,3-Trimethylbenzene	UG/L	---	---	---	---	---	< 1.00 U
1,2,4-Trichlorobenzene	UG/L	---	---	---	---	---	---
1,2,4-Trimethylbenzene	UG/L	---	---	---	---	---	< 1.00 U
1,2-Dibromo-3-chloropropane	UG/L	---	---	---	---	---	< 0.1003 U
1,2-Dichlorobenzene	UG/L	---	---	---	---	---	< 1.00 U
1,2-Dichloroethane	UG/L	---	---	---	---	---	< 1.00 U
1,2-Dichloropropane	UG/L	---	---	---	---	---	---
1,3,5-Trimethylbenzene	UG/L	---	---	---	---	---	< 1.00 U
1,3-Dichlorobenzene	UG/L	---	---	---	---	---	< 1.00 U
1,4-Dichlorobenzene	UG/L	---	---	---	---	---	< 1.00 U
Acetone	UG/L	---	---	---	---	---	< 50.0 U
Benzene	UG/L	< 0.500 U	< 0.500 U	---	---	---	< 1.00 U
Carbon disulfide	UG/L	---	---	---	---	---	< 1.00 U
Carbon Tetrachloride	UG/L	---	---	---	---	---	< 1.00 U
Chlorobenzene	UG/L	---	---	---	---	---	< 1.00 U
Chloroform	UG/L	---	---	---	---	---	< 1.00 U
cis-1,2-Dichloroethene	UG/L	---	---	---	---	---	< 1.00 U
Diisopropyl Ether	UG/L	---	---	---	---	---	< 1.00 U
Ethanol	UG/L	---	---	---	---	---	< 100 U
Ethyl tert-Butyl Ether	UG/L	---	---	---	---	---	< 1.00 U
Ethylbenzene	UG/L	< 0.500 U	< 0.500 U	---	---	---	< 1.00 U
Hexachlorobutadiene	UG/L	---	---	---	---	---	< 0.9 U
Isopropyl alcohol	UG/L	---	---	---	---	---	< 50.0 U
Isopropylbenzene	UG/L	---	---	---	---	---	< 1.00 U
m,p-Xylene	UG/L	---	---	---	---	---	< 2.00 U
Methoxychlor	UG/L	---	---	---	---	---	< 0.0238 U
Methyl tert-Butyl Ether	UG/L	---	---	---	---	---	< 1.00 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER A

	Property Owner	PROPERTY OWNER A	PROPERTY OWNER A	PROPERTY OWNER A	PROPERTY OWNER A	PROPERTY OWNER A	PROPERTY OWNER A
	Location Description	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL	ON WATER SUPPLY, BYPASSED PRESSURE TANK, SAMPLED WATER DIRECTLY FROM WELL
	Source Type	WELL	WELL	WELL	WELL	WELL	WELL
	Well Depth	300	300	300	300	300	300
	Sampled Before Treatment?	Pre-Treatment	NA	NA	NA	NA	NA
	Sample ID	1013201000201	0718201120201	0804201122804	0818201120203	0901201120201	1104201120202
Parameter and units	Sample Date	10/13/2010	7/18/2011	8/4/2011	8/18/2011	9/1/2011	11/4/2011
Methylene Chloride	UG/L	---	---	---	---	---	< 5.00 U
Naphthalene	UG/L	---	---	---	---	---	< 5.00 U
o-Xylene	UG/L	---	---	---	---	---	< 1.00 U
Styrene	UG/L	---	---	---	---	---	---
Tert-Amyl Methyl Ether	UG/L	---	---	---	---	---	< 1.00 U
Tertiary Butyl Alcohol	UG/L	---	---	---	---	---	< 10.0 U
Tetrachloroethene	UG/L	---	---	---	---	---	< 1.00 U
Tetrahydrofuran	UG/L	---	---	---	---	---	< 20.0 U
Toluene	UG/L	100	< 0.500 U	---	---	---	< 1.00 U
trans-1,2-Dichloroethene	UG/L	---	---	---	---	---	< 1.00 U
Trichloroethene	UG/L	---	---	---	---	---	< 1.00 U
Vinyl chloride	UG/L	---	---	---	---	---	< 1.00 U
Xylenes, total	UG/L	< 0.500 U	< 0.500 U	---	---	---	< 3.00 U

Notes:

U : Parameter not detected at posted limit
< : Parameter not detected at posted limit
ND : Parameter not detected
H : Parameter analyzed beyond method recommended holding time
J : Estimated value
--- : Parameter not analyzed.
B : Blank qualified
ug/L : Micrograms per liter
mg/L : Milligrams per liter
NA : Not Available
NTU : Nephelometric Turbidity Unit
umho/cm : Micromhos per centimeter
colonies/100 ml : Colonies per 100 millileters

APPENDIX A-2
EPA STUDY WELL DATA
PROPERTY OWNER B

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER B

Property Owner		PROPERTY OWNER B	PROPERTY OWNER B
Location Description			THE SPRING IS LOCATED NORTHWEST OF THE HOUSE; THE OWNER RECENTLY SHOCKED THE SPRING TWO WEEKS AGO WITH CHLORINE; IT HAS A CONCRETE SLAB USED AS A COVER THAT WAS INSTALLED TWO WEEKS AGO.
Source Type		SPRING	SPRING
Well Depth		Not Applicable	Not Applicable
Sampled Before Treatment?		NA	Pre-Treatment
Sample ID		1014201012005	1104201120201
Parameter and units	Sample Date	10/14/2010 (Baseline)	11/4/2011
Aldehydes			
Gluteraldehyde	UG/L	---	---
Bacteria			
E. coli	colonies/100ml	---	Present
Fecal coliform bacteria	colonies/100ml	---	5
Total Coliform Bacteria	colonies/100ml	---	Present
DBCP			
1,2-Dibromo-3-chloropropane	UG/L	---	< 0.1000 U
Extractable Petroleum Hydrocarbons			
Diesel	UG/L	---	< 95.2 U
General Chemistry			
Alkalinity, Total (CaCO3)	MG/L	---	25.2
Ammonia as N	MG/L	---	1.22
Bicarbonate Alkalinity as CaCO3	MG/L	21.2	25.2
Bromide	MG/L	---	< 2.5 U
Carbonate as CaCO3	MG/L	< 10.0 U	< 10.0 U
Chloride	MG/L	< 5.00 UH	2.8
CO2 by Headspace	UG/L	---	24000
Cyanide	MG/L	---	---
Fluoride	MG/L	---	< 0.50 U
MBAS	MG/L	0.0611	< 0.12 U
Nitrate	MG/L	---	---
Nitrate Nitrogen	MG/L	---	1.6
Nitrite Nitrogen	MG/L	---	< 0.50 U
Oil & Grease HEM	MG/L	< 6.41 U	< 5.13 U
pH	pH UNITS	6.30 H	6.10 H
Phosphorus	MG/L	---	< 0.100 U
Specific conductance	UMHO/CM	82.6	92.3
Sulfate	MG/L	11.0 H	12.3
Temperature of pH determination	CELSIUS	21.1 H	22.0 H
Total Dissolved Solids	MG/L	64	61.0 J
Total Suspended Solids	MG/L	< 1.00 U	< 1.00 U
Turbidity	NTU	< 1.00 U	0.89
Glycols			
1,2-Propylene Glycol	MG/L	---	---
Diethylene Glycol	MG/L	---	< 10 U
Ethylene Glycol	MG/L	---	---
Tetraethylene glycol	MG/L	---	< 10 UJ
Triethylene glycol	MG/L	---	< 10 U
Light Gases			
Acetylene	MG/L	---	< 0.00500 U
Ethane	MG/L	< 0.0260 U	< 0.00500 U
Ethene	MG/L	---	< 0.00500 U
Methane	MG/L	< 0.0260 U	< 0.00500 U
n-Butane	MG/L	---	< 0.00500 U
Propane	MG/L	< 0.0340 U	< 0.00500 U
Low Molecular Weight Acids			
Acetic Acid	UG/L	---	< 10000 U
Butyric Acid	UG/L	---	< 10000 U
Formic Acid	UG/L	---	< 10000 U
Isobutyric acid	UG/L	---	< 10000 U
Lactic acid	UG/L	---	< 5000 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER B

Property Owner		PROPERTY OWNER B	PROPERTY OWNER B
Location Description			THE SPRING IS LOCATED NORTHWEST OF THE HOUSE; THE OWNER RECENTLY SHOCKED THE SPRING TWO WEEKS AGO WITH CHLORINE; IT HAS A CONCRETE SLAB USED AS A COVER THAT WAS INSTALLED TWO WEEKS AGO.
Source Type		SPRING	SPRING
Well Depth		Not Applicable	Not Applicable
Sampled Before Treatment?		NA	Pre-Treatment
Sample ID		1014201012005	1104201120201
Parameter and units	Sample Date	10/14/2010 (Baseline)	11/4/2011
Propionic Acid	UG/L	---	< 13000 U
Metals, 6020x			
Cesium	MG/L	---	< 0.1 U
Cesium, Dissolved	MG/L	---	< 0.1 U
Potassium	MG/L	---	< 100 U
Potassium, Dissolved	MG/L	---	< 100 U
Silicon	MG/L	---	< 2500 U
Silicon, Dissolved	MG/L	---	< 2500 U
Thorium	MG/L	---	< 2 U
Thorium, Dissolved	MG/L	---	< 2 U
Uranium	MG/L	---	< 1 U
Uranium, Dissolved	MG/L	---	< 1 U
Metals, Total			
Aluminum	MG/L	---	< 0.0200 U
Antimony	MG/L	---	< 0.00200 U
Arsenic	MG/L	< 0.0100 U	< 0.00200 U
Barium	MG/L	0.144	0.14
Beryllium	MG/L	---	< 0.00200 U
Boron	MG/L	---	< 0.0500 U
Cadmium	MG/L	< 0.00100 U	< 0.00100 U
Calcium	MG/L	9.34	9.04
Chromium	MG/L	< 0.00500 U	< 0.00200 U
Cobalt	MG/L	---	< 0.00200 U
Copper	MG/L	---	< 0.00500 U
Hardness, CaCO3	MG/L	---	---
Iron	MG/L	< 0.0500 U	< 0.0500 U
Lead	MG/L	< 0.00500 U	< 0.00200 U
Lithium	MG/L	---	---
Magnesium	MG/L	2.72	2.49
Manganese	MG/L	< 0.0150 U	< 0.00500 U
Mercury	MG/L	< 0.000200 U	< 0.000200 U
Molybdenum	MG/L	---	< 0.00500 U
Nickel	MG/L	---	< 0.00500 U
Potassium	MG/L	< 1.00 U	< 1.00 U
Selenium	MG/L	< 0.0100 U	< 0.00200 U
Silver	MG/L	< 0.00500 U	< 0.00200 U
Sodium	MG/L	2	2
Strontium	MG/L	---	< 0.0500 U
Sulfur	MG/L	3.1	2.96
Thallium	MG/L	---	< 0.00200 U
Titanium	MG/L	---	< 0.00200 U
Vanadium	MG/L	---	< 0.00400 U
Zinc	MG/L	---	< 0.0500 U
Metals, Dissolved			
Aluminum, Dissolved	MG/L	---	< 0.0200 U
Antimony, Dissolved	MG/L	---	< 0.00200 U
Arsenic, Dissolved	MG/L	---	< 0.00200 U
Barium, Dissolved	MG/L	---	0.14
Beryllium, Dissolved	MG/L	---	< 0.00200 U
Boron, Dissolved	MG/L	---	< 0.0500 U
Cadmium, Dissolved	MG/L	---	< 0.00100 U
Calcium, Dissolved	MG/L	---	10.2

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER B

Property Owner		PROPERTY OWNER B	PROPERTY OWNER B
Location Description			THE SPRING IS LOCATED NORTHWEST OF THE HOUSE; THE OWNER RECENTLY SHOCKED THE SPRING TWO WEEKS AGO WITH CHLORINE; IT HAS A CONCRETE SLAB USED AS A COVER THAT WAS INSTALLED TWO WEEKS AGO.
Source Type		SPRING	SPRING
Well Depth		Not Applicable	Not Applicable
Sampled Before Treatment?		NA	Pre-Treatment
Sample ID		1014201012005	1104201120201
Parameter and units	Sample Date	10/14/2010 (Baseline)	11/4/2011
Chromium, Dissolved	MG/L	---	< 0.00200 U
Cobalt, Dissolved	MG/L	---	< 0.00200 U
Copper, Dissolved	MG/L	---	< 0.00500 U
Iron, Dissolved	MG/L	---	< 0.0500 U
Lead, Dissolved	MG/L	---	< 0.00200 U
Magnesium, Dissolved	MG/L	---	2.86
Manganese, Dissolved	MG/L	---	< 0.00500 U
Mercury, Dissolved	MG/L	---	< 0.000200 U
Molybdenum, Dissolved	MG/L	---	< 0.00500 U
Nickel, Dissolved	MG/L	---	< 0.00500 U
Potassium, Dissolved	MG/L	---	< 1.00 U
Selenium, Dissolved	MG/L	---	< 0.00200 U
Silver, Dissolved	MG/L	---	< 0.00200 U
Sodium, Dissolved	MG/L	---	3.04
Strontium, Dissolved	MG/L	---	< 0.0500 U
Sulfur, Dissolved	MG/L	---	3.32
Thallium, Dissolved	MG/L	---	< 0.00200 U
Titanium, Dissolved	MG/L	---	< 0.00200 U
Vanadium, Dissolved	MG/L	---	< 0.00400 U
Zinc, Dissolved	MG/L	---	< 0.0500 U
Miscellaneous Organics			
Inorganic Carbon, Dissolved	MG/L	---	5.24
Organic Carbon, Dissolved	MG/L	---	1.08
Pesticides and PCBs			
4,4'-DDD	UG/L	---	< 0.0240 U
4,4'-DDE	UG/L	---	< 0.0240 U
4,4'-DDT	UG/L	---	< 0.0240 U
Aldrin	UG/L	---	< 0.024 U
alpha-BHC	UG/L	---	< 0.0240 U
Azinphos-methyl	UG/L	---	< 0.96 U
beta-BHC	UG/L	---	< 0.0240 U
Carbaryl	UG/L	---	< 6.0 U
delta-BHC	UG/L	---	< 0.0240 U
Dichlorvos	UG/L	---	< 0.96 U
Dieldrin	UG/L	---	< 0.0240 U
Disulfoton	UG/L	---	< 0.96 U
Endosulfan I	UG/L	---	< 0.0240 U
Endosulfan II	UG/L	---	< 0.0240 U
Endosulfan sulfate	UG/L	---	< 0.0240 U
Endrin	UG/L	---	< 0.0240 U
Endrin aldehyde	UG/L	---	< 0.0240 U
Endrin ketone	UG/L	---	< 0.0240 U
gamma-BHC (Lindane)	UG/L	---	< 0.0240 U
Heptachlor	UG/L	---	< 0.0240 U
Heptachlor epoxide	UG/L	---	< 0.0240 U
Malathion	UG/L	---	< 0.96 U
Methoxychlor	UG/L	---	< 0.0240 U
Mevinphos	UG/L	---	< 0.96 U
Purgeable Petroleum Hydrocarbons			
GRO as Gasoline	UG/L	---	< 100 U
Semivolatile Organics			
1,2,4,5-Tetrachlorobenzene	UG/L	---	< 1 U
1,2-Dinitrobenzene	UG/L	---	< 5 U
1,2-Diphenylhydrazine	UG/L	---	< 1 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER B

Property Owner		PROPERTY OWNER B	PROPERTY OWNER B
Location Description			THE SPRING IS LOCATED NORTHWEST OF THE HOUSE; THE OWNER RECENTLY SHOCKED THE SPRING TWO WEEKS AGO WITH CHLORINE; IT HAS A CONCRETE SLAB USED AS A COVER THAT WAS INSTALLED TWO WEEKS AGO.
Source Type		SPRING	SPRING
Well Depth		Not Applicable	Not Applicable
Sampled Before Treatment?		NA	Pre-Treatment
Sample ID		1014201012005	1104201120201
Parameter and units	Sample Date	10/14/2010 (Baseline)	11/4/2011
1,3-Dimethyl adamatane	UG/L	---	< 5 U
1,3-Dinitrobenzene	UG/L	---	< 5 U
1,4-Dinitrobenzene	UG/L	---	< 5 U
1-Chloronaphthalene	UG/L	---	< 1 U
2,3,4,6-Tetrachlorophenol	UG/L	---	< 1 U
2,4,5-Trichlorophenol	UG/L	---	< 1 U
2,4,6-Trichlorophenol	UG/L	---	< 1 U
2,4-Dichlorophenol	UG/L	---	< 1 U
2,4-Dimethylphenol	UG/L	---	< 1 U
2,4-Dinitrophenol	UG/L	---	< 29 U
2,4-Dinitrotoluene	UG/L	---	< 5 U
2,6-Dichlorophenol	UG/L	---	< 1 U
2,6-Dinitrotoluene	UG/L	---	< 1 U
2-Butoxyethanol	UG/L	---	< 5 UJ
2-Chloronaphthalene	UG/L	---	< 1 U
2-Chlorophenol	UG/L	---	< 1 U
2-Methylnaphthalene	UG/L	---	< 0.5 U
2-Methylphenol	UG/L	---	< 1 U
2-Nitroaniline	UG/L	---	< 1 U
2-Nitrophenol	UG/L	---	< 1 U
3,3-Dichlorobenzidine	UG/L	---	< 5 U
3-Nitroaniline	UG/L	---	< 1 U
4,4'-Methylenebis(2-chloroaniline)	UG/L	---	< 15 UJ
4,4'-Methylenebis(N,N-dimethylanilin	UG/L	---	< 15 UJ
4,6-Dinitro-2-methylphenol	UG/L	---	< 15 U
4-Bromophenyl phenyl ether	UG/L	---	< 1 U
4-Chloro-3-methylphenol	UG/L	---	< 1 UJ
4-Chloroaniline	UG/L	---	< 1 U
4-Chlorophenyl phenyl ether	UG/L	---	< 1 U
4-Methylphenol	UG/L	---	< 1 U
4-Nitroaniline	UG/L	---	< 1 U
4-Nitrophenol	UG/L	---	< 29 U
Acenaphthene	UG/L	---	< 0.5 U
Acenaphthylene	UG/L	---	< 0.5 U
Acetophenone	UG/L	---	< 1 U
Adamantane	UG/L	---	< 5 U
Aniline	UG/L	---	< 1 U
Anthracene	UG/L	---	< 0.5 U
Benzo (a) anthracene	UG/L	---	< 0.5 UJ
Benzo (a) pyrene	UG/L	---	< 0.5 U
Benzo (b) fluoranthene	UG/L	---	< 0.5 U
Benzo (g,h,i) perylene	UG/L	---	< 0.5 U
Benzo (k) fluoranthene	UG/L	---	< 0.5 U
Benzoic acid	UG/L	---	< 15 UJ
Benzyl alcohol	UG/L	---	< 15 U
Bis(2-chloroethoxy)methane	UG/L	---	< 1 U
Bis(2-chloroethyl)ether	UG/L	---	< 1 U
bis(2-Chloroisopropyl)ether	UG/L	---	< 1 U
Bis(2-ethylhexyl)phthalate	UG/L	---	< 5 UJ
Butyl benzyl phthalate	UG/L	---	< 5 UJ
Carbazole	UG/L	---	< 1 U
Chlorobenzilate	UG/L	---	< 10 U
Chrysene	UG/L	---	< 0.5 UJ
Diallate (cis or trans)	UG/L	---	< 5 U
Dibenz (a,h) anthracene	UG/L	---	< 0.5 U
Dibenzofuran	UG/L	---	< 1 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER B

Property Owner		PROPERTY OWNER B	PROPERTY OWNER B
Location Description			THE SPRING IS LOCATED NORTHWEST OF THE HOUSE; THE OWNER RECENTLY SHOCKED THE SPRING TWO WEEKS AGO WITH CHLORINE; IT HAS A CONCRETE SLAB USED AS A COVER THAT WAS INSTALLED TWO WEEKS AGO.
Source Type		SPRING	SPRING
Well Depth		Not Applicable	Not Applicable
Sampled Before Treatment?		NA	Pre-Treatment
Sample ID		1014201012005	1104201120201
Parameter and units	Sample Date	10/14/2010 (Baseline)	11/4/2011
Diethyl phthalate	UG/L	---	< 5 U
Dimethyl phthalate	UG/L	---	< 5 U
Di-n-butyl phthalate	UG/L	---	< 5 U
Di-n-octyl phthalate	UG/L	---	< 5 U
Dinoseb	UG/L	---	< 5 U
Disulfoton	UG/L	---	< 48 U
d-Limonene	UG/L	---	< 5 U
Fluoranthene	UG/L	---	< 0.5 U
Fluorene	UG/L	---	< 0.5 U
Hexachlorobenzene	UG/L	---	< 0.5 U
Hexachlorobutadiene	UG/L	---	< 1 U
Hexachlorocyclopentadiene	UG/L	---	< 15 U
Hexachloroethane	UG/L	---	< 5 U
Indeno (1,2,3-cd) pyrene	UG/L	---	< 0.5 U
Isophorone	UG/L	---	< 1 U
Naphthalene	UG/L	---	< 0.5 U
Nitrobenzene	UG/L	---	< 1 U
N-Nitrosodiethylamine	UG/L	---	< 1 U
N-Nitrosodimethylamine	UG/L	---	< 5 U
N-Nitrosodi-n-butylamine	UG/L	---	< 5 U
N-Nitrosodi-n-propylamine	UG/L	---	< 1 U
N-Nitrosodiphenylamine	UG/L	---	< 1 U
N-Nitrosomethylethylamine	UG/L	---	< 5 U
Parathion-ethyl	UG/L	---	< 5 U
Parathion-methyl	UG/L	---	< 5 U
Pentachlorobenzene	UG/L	---	< 1 U
Pentachlorophenol	UG/L	---	< 5 U
Phenanthrene	UG/L	---	< 0.5 U
Phenol	UG/L	---	< 1 U
Phorate	UG/L	---	< 1 U
Pronamide	UG/L	---	< 1 U
Pyrene	UG/L	---	< 0.5 U
Pyridine	UG/L	---	< 5 U
Squalene	UG/L	---	< 5 UJ
Terbufos	UG/L	---	< 5 UJ
Terpineol	UG/L	---	< 5 U
Tributoxyethyl phosphate	UG/L	---	< 5 U
Trifluralin	UG/L	---	< 5 UJ
TICs			
1,2,3-Trimethylbenzene	UG/L	---	---
Volatile Organics			
1,1,1-Trichloroethane	UG/L	---	< 1.00 U
1,1,2-Trichloroethane	UG/L	---	< 1.00 U
1,1-Dichloroethane	UG/L	---	< 1.00 U
1,1-Dichloroethene	UG/L	---	< 1.00 U
1,2,3-Trimethylbenzene	UG/L	---	< 1.00 U
1,2,4-Trichlorobenzene	UG/L	---	---
1,2,4-Trimethylbenzene	UG/L	---	< 1.00 U
1,2-Dibromo-3-chloropropane	UG/L	---	< 0.1000 U
1,2-Dichlorobenzene	UG/L	---	< 1.00 U
1,2-Dichloroethane	UG/L	---	< 1.00 U
1,2-Dichloropropane	UG/L	---	---
1,3,5-Trimethylbenzene	UG/L	---	< 1.00 U
1,3-Dichlorobenzene	UG/L	---	< 1.00 U
1,4-Dichlorobenzene	UG/L	---	< 1.00 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER B

Property Owner		PROPERTY OWNER B	PROPERTY OWNER B
Location Description			THE SPRING IS LOCATED NORTHWEST OF THE HOUSE; THE OWNER RECENTLY SHOCKED THE SPRING TWO WEEKS AGO WITH CHLORINE; IT HAS A CONCRETE SLAB USED AS A COVER THAT WAS INSTALLED TWO WEEKS AGO.
Source Type		SPRING	SPRING
Well Depth		Not Applicable	Not Applicable
Sampled Before Treatment?		NA	Pre-Treatment
Sample ID		1014201012005	1104201120201
Parameter and units	Sample Date	10/14/2010 (Baseline)	11/4/2011
Acetone	UG/L	---	< 50.0 U
Benzene	UG/L	< 0.500 U	< 1.00 U
Carbon disulfide	UG/L	---	< 1.00 U
Carbon Tetrachloride	UG/L	---	< 1.00 U
Chlorobenzene	UG/L	---	< 1.00 U
Chloroform	UG/L	---	< 1.00 U
cis-1,2-Dichloroethene	UG/L	---	< 1.00 U
Diisopropyl Ether	UG/L	---	< 1.00 U
Ethanol	UG/L	---	< 100 U
Ethyl tert-Butyl Ether	UG/L	---	< 1.00 U
Ethylbenzene	UG/L	< 0.500 U	< 1.00 U
Hexachlorobutadiene	UG/L	---	< 1 U
Isopropyl alcohol	UG/L	---	< 50.0 U
Isopropylbenzene	UG/L	---	< 1.00 U
m,p-Xylene	UG/L	---	< 2.00 U
Methoxychlor	UG/L	---	< 0.0240 U
Methyl tert-Butyl Ether	UG/L	---	< 1.00 U
Methylene Chloride	UG/L	---	< 5.00 U
Naphthalene	UG/L	---	< 5.00 U
o-Xylene	UG/L	---	< 1.00 U
Styrene	UG/L	---	---
Tert-Amyl Methyl Ether	UG/L	---	< 1.00 U
Tertiary Butyl Alcohol	UG/L	---	< 10.0 U
Tetrachloroethene	UG/L	---	< 1.00 U
Tetrahydrofuran	UG/L	---	< 20.0 U
Toluene	UG/L	< 0.500 U	< 1.00 U
trans-1,2-Dichloroethene	UG/L	---	< 1.00 U
Trichloroethene	UG/L	---	< 1.00 U
Vinyl chloride	UG/L	---	< 1.00 U
Xylenes, total	UG/L	< 0.500 U	< 3.00 U

Notes:

U : Parameter not detected at posted limit
< : Parameter not detected at posted limit
ND : Parameter not detected
H : Parameter analyzed beyond method recommended holding time
J : Estimated value
--- : Parameter not analyzed.
B : Blank qualified
ug/L : Micrograms per liter
mg/L : Milligrams per liter
NA : Not Available
NTU : Nephelometric Turbidity Unit
umho/cm : Micromhos per centimeter
colonies/100 ml : Colonies per 100 milliliters

APPENDIX A-3
EPA STUDY WELL DATA
PROPERTY OWNER C

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER C

Property Owner		PROPERTY OWNER C	PROPERTY OWNER C
Location Description		WELL LOCATED 5 FEET OFF OF NE CORNER OF HOUSE; INACCESSIBLE-WELL HEAD IS BURIED; SAMPLED FROM BASEMENT SPIGOT	WELL LOCATED 5 FEET OFF OF NE CORNER OF HOUSE; INACCESSIBLE-WELL HEAD IS BURIED; SAMPLED FROM BASEMENT SPIGOT
Source Type		WELL	WELL
Well Depth		260	260
Sampled Before Treatment?		Pre-Treatment	Pre-Treatment
Sample ID		0429201113403	1027201120201
Parameter and units	Sample Date	4/29/2011 (Baseline)	10/27/2011
Aldehydes			
Gluteraldehyde	UG/L	---	---
Bacteria			
E. coli	colonies/100ml	---	Absent
Fecal coliform bacteria	colonies/100ml	---	< 1 U
Total Coliform Bacteria	colonies/100ml	---	Absent
DBCP			
1,2-Dibromo-3-chloropropane	UG/L	---	< 0.1009 U
Extractable Petroleum Hydrocarbons			
Diesel	UG/L	---	< 94.3 U
General Chemistry			
Alkalinity, Total (CaCO3)	MG/L	---	166
Ammonia as N	MG/L	---	0.131
Bicarbonate Alkalinity as CaCO3	MG/L	161	156
Bromide	MG/L	---	3.3
Carbonate as CaCO3	MG/L	< 10.0 U	12.2
Chloride	MG/L	413	351
CO2 by Headspace	UG/L	---	< 12000 U
Cyanide	MG/L	---	---
Fluoride	MG/L	---	0.68
MBAS	MG/L	< 0.0500 U	< 0.12 U
Nitrate	MG/L	---	---
Nitrate Nitrogen	MG/L	---	< 0.50 U
Nitrite Nitrogen	MG/L	---	< 0.50 U
Oil & Grease HEM	MG/L	< 5.0 U	< 4.94 U
pH	pH UNITS	8.50 H	8.30 H
Phosphorus	MG/L	---	< 0.100 U
Specific conductance	UMHO/CM	1780	1270
Sulfate	MG/L	10.3	21.4 J
Temperature of pH determination	CELSIUS	21.1 H	21.0 H
Total Dissolved Solids	MG/L	842	726
Total Suspended Solids	MG/L	2	2.8
Turbidity	NTU	3	5
Glycols			
1,2-Propylene Glycol	MG/L	---	---
Diethylene Glycol	MG/L	---	< 10 U
Ethylene Glycol	MG/L	---	---
Tetraethylene glycol	MG/L	---	< 10 UJ
Triethylene glycol	MG/L	---	< 10 U
Light Gases			
Acetylene	MG/L	---	< 0.00500 U
Ethane	MG/L	< 0.0260 U	< 0.00500 U
Ethene	MG/L	---	< 0.00500 U
Methane	MG/L	21.5	22.5
n-Butane	MG/L	---	< 0.00500 U
Propane	MG/L	< 0.0340 U	< 0.00500 U
Low Molecular Weight Acids			
Acetic Acid	UG/L	---	< 10000 U
Butyric Acid	UG/L	---	< 10000 U
Formic Acid	UG/L	---	< 10000 U
Isobutyric acid	UG/L	---	< 10000 U
Lactic acid	UG/L	---	< 5000 U
Propionic Acid	UG/L	---	< 13000 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER C

Property Owner		PROPERTY OWNER C	PROPERTY OWNER C
Location Description		WELL LOCATED 5 FEET OFF OF NE CORNER OF HOUSE; INACCESSIBLE-WELL HEAD IS BURIED; SAMPLED FROM BASEMENT SPIGOT	WELL LOCATED 5 FEET OFF OF NE CORNER OF HOUSE; INACCESSIBLE-WELL HEAD IS BURIED; SAMPLED FROM BASEMENT SPIGOT
Source Type		WELL	WELL
Well Depth		260	260
Sampled Before Treatment?		Pre-Treatment	Pre-Treatment
Sample ID		0429201113403	1027201120201
Parameter and units	Sample Date	4/29/2011 (Baseline)	10/27/2011
Metals, 6020x			
Cesium	MG/L	---	0.0013
Cesium, Dissolved	MG/L	---	0.00071
Potassium	MG/L	---	2.96
Potassium, Dissolved	MG/L	---	2.68
Silicon	MG/L	---	3.64
Silicon, Dissolved	MG/L	---	3.27
Thorium	MG/L	---	< 0.002 U
Thorium, Dissolved	MG/L	---	< 0.002 U
Uranium	MG/L	---	< 0.001 U
Uranium, Dissolved	MG/L	---	< 0.001 U
Metals, Total			
Aluminum	MG/L	---	0.262
Antimony	MG/L	---	< 0.00200 U
Arsenic	MG/L	< 0.0100 U	0.00746
Barium	MG/L	1.95	1.58
Beryllium	MG/L	---	< 0.00200 U
Boron	MG/L	---	0.334
Cadmium	MG/L	< 0.00100 U	< 0.00100 U
Calcium	MG/L	14.2	11.7
Chromium	MG/L	< 0.00500 U	< 0.00200 U
Cobalt	MG/L	---	< 0.00200 U
Copper	MG/L	---	< 0.00500 U
Hardness, CaCO3	MG/L	---	---
Iron	MG/L	0.285	0.368
Lead	MG/L	< 0.00500 U	< 0.00200 U
Lithium	MG/L	---	---
Magnesium	MG/L	2.8	2.38
Manganese	MG/L	0.0249	0.0106
Mercury	MG/L	< 0.000200 U	< 0.000200 U
Molybdenum	MG/L	---	< 0.00500 U
Nickel	MG/L	---	< 0.00500 U
Potassium	MG/L	3.57	2.84
Selenium	MG/L	< 0.0100 U	< 0.00200 U
Silver	MG/L	< 0.00500 U	< 0.00200 U
Sodium	MG/L	312	268
Strontium	MG/L	---	1.67
Sulfur	MG/L	0.746	< 0.500 U
Thallium	MG/L	---	< 0.00200 U
Titanium	MG/L	---	0.00475
Vanadium	MG/L	---	< 0.00400 U
Zinc	MG/L	---	< 0.0500 U
Metals, Dissolved			
Aluminum, Dissolved	MG/L	---	< 0.0200 U
Antimony, Dissolved	MG/L	---	< 0.00200 U
Arsenic, Dissolved	MG/L	---	0.00456
Barium, Dissolved	MG/L	---	1.28
Beryllium, Dissolved	MG/L	---	< 0.00200 U
Boron, Dissolved	MG/L	---	0.328
Cadmium, Dissolved	MG/L	---	< 0.00100 U
Calcium, Dissolved	MG/L	---	9.14
Chromium, Dissolved	MG/L	---	< 0.00200 U
Cobalt, Dissolved	MG/L	---	< 0.00200 U
Copper, Dissolved	MG/L	---	< 0.00500 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER C

Property Owner		PROPERTY OWNER C	PROPERTY OWNER C
Location Description		WELL LOCATED 5 FEET OFF OF NE CORNER OF HOUSE; INACCESSIBLE-WELL HEAD IS BURIED; SAMPLED FROM BASEMENT SPIGOT	WELL LOCATED 5 FEET OFF OF NE CORNER OF HOUSE; INACCESSIBLE-WELL HEAD IS BURIED; SAMPLED FROM BASEMENT SPIGOT
Source Type		WELL	WELL
Well Depth		260	260
Sampled Before Treatment?		Pre-Treatment	Pre-Treatment
Sample ID		0429201113403	1027201120201
Parameter and units	Sample Date	4/29/2011 (Baseline)	10/27/2011
Iron, Dissolved	MG/L	---	< 0.0500 U
Lead, Dissolved	MG/L	---	< 0.00200 U
Magnesium, Dissolved	MG/L	---	1.9
Manganese, Dissolved	MG/L	---	0.0118
Mercury, Dissolved	MG/L	---	< 0.000200 U
Molybdenum, Dissolved	MG/L	---	< 0.00500 U
Nickel, Dissolved	MG/L	---	< 0.00500 U
Potassium, Dissolved	MG/L	---	2.5
Selenium, Dissolved	MG/L	---	< 0.00200 U
Silver, Dissolved	MG/L	---	< 0.00200 U
Sodium, Dissolved	MG/L	---	244
Strontium, Dissolved	MG/L	---	1.37
Sulfur, Dissolved	MG/L	---	< 0.500 U
Thallium, Dissolved	MG/L	---	< 0.00200 U
Titanium, Dissolved	MG/L	---	< 0.00200 U
Vanadium, Dissolved	MG/L	---	< 0.00400 U
Zinc, Dissolved	MG/L	---	< 0.0500 U
Miscellaneous Organics			
Inorganic Carbon, Dissolved	MG/L	---	36.4
Organic Carbon, Dissolved	MG/L	---	< 1.00 U
Pesticides and PCBs			
4,4'-DDD	UG/L	---	< 0.0472 U
4,4'-DDE	UG/L	---	< 0.0472 U
4,4'-DDT	UG/L	---	< 0.0472 U
Aldrin	UG/L	---	< 0.0472 U
alpha-BHC	UG/L	---	< 0.0472 U
Azinphos-methyl	UG/L	---	< 0.94 U
beta-BHC	UG/L	---	< 0.0472 U
Carbaryl	UG/L	---	< 6.0 U
delta-BHC	UG/L	---	< 0.0472 U
Dichlorvos	UG/L	---	< 0.94 U
Dieldrin	UG/L	---	< 0.0472 U
Disulfoton	UG/L	---	< 0.94 U
Endosulfan I	UG/L	---	< 0.0472 U
Endosulfan II	UG/L	---	< 0.0472 U
Endosulfan sulfate	UG/L	---	< 0.0472 U
Endrin	UG/L	---	< 0.0472 U
Endrin aldehyde	UG/L	---	< 0.0472 U
Endrin ketone	UG/L	---	< 0.0472 U
gamma-BHC (Lindane)	UG/L	---	< 0.0472 U
Heptachlor	UG/L	---	< 0.0472 U
Heptachlor epoxide	UG/L	---	< 0.0472 U
Malathion	UG/L	---	< 0.94 U
Methoxychlor	UG/L	---	< 0.0472 U
Mevinphos	UG/L	---	< 0.94 U
Purgeable Petroleum Hydrocarbons			
GRO as Gasoline	UG/L	---	< 100 U
Semivolatile Organics			
1,2,4,5-Tetrachlorobenzene	UG/L	---	< 1 U
1,2-Dinitrobenzene	UG/L	---	< 5 U
1,2-Diphenylhydrazine	UG/L	---	< 1 U
1,3-Dimethyl adamatane	UG/L	---	< 5 U
1,3-Dinitrobenzene	UG/L	---	< 5 U
1,4-Dinitrobenzene	UG/L	---	< 5 U
1-Chloronaphthalene	UG/L	---	< 1 U
2,3,4,6-Tetrachlorophenol	UG/L	---	< 1 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER C

Property Owner		PROPERTY OWNER C	PROPERTY OWNER C
Location Description		WELL LOCATED 5 FEET OFF OF NE CORNER OF HOUSE; INACCESSIBLE-WELL HEAD IS BURIED; SAMPLED FROM BASEMENT SPIGOT	WELL LOCATED 5 FEET OFF OF NE CORNER OF HOUSE; INACCESSIBLE-WELL HEAD IS BURIED; SAMPLED FROM BASEMENT SPIGOT
Source Type		WELL	WELL
Well Depth		260	260
Sampled Before Treatment?		Pre-Treatment	Pre-Treatment
Sample ID		0429201113403	1027201120201
Parameter and units	Sample Date	4/29/2011 (Baseline)	10/27/2011
2,4,5-Trichlorophenol	UG/L	---	< 1 U
2,4,6-Trichlorophenol	UG/L	---	< 1 U
2,4-Dichlorophenol	UG/L	---	< 1 U
2,4-Dimethylphenol	UG/L	---	< 1 U
2,4-Dinitrophenol	UG/L	---	< 29 U
2,4-Dinitrotoluene	UG/L	---	< 5 U
2,6-Dichlorophenol	UG/L	---	< 1 U
2,6-Dinitrotoluene	UG/L	---	< 1 U
2-Butoxyethanol	UG/L	---	< 5 U
2-Chloronaphthalene	UG/L	---	< 1 U
2-Chlorophenol	UG/L	---	< 1 U
2-Methylnaphthalene	UG/L	---	< 0.5 U
2-Methylphenol	UG/L	---	< 1 U
2-Nitroaniline	UG/L	---	< 1 U
2-Nitrophenol	UG/L	---	< 1 U
3,3-Dichlorobenzidine	UG/L	---	< 5 U
3-Nitroaniline	UG/L	---	< 1 U
4,4'-Methylenebis(2-chloroaniline)	UG/L	---	< 14 UJ
4,4'-Methylenebis(N,N-dimethylanilir	UG/L	---	< 14 U
4,6-Dinitro-2-methylphenol	UG/L	---	< 14 U
4-Bromophenyl phenyl ether	UG/L	---	< 1 U
4-Chloro-3-methylphenol	UG/L	---	< 1 U
4-Chloroaniline	UG/L	---	< 1 U
4-Chlorophenyl phenyl ether	UG/L	---	< 1 U
4-Methylphenol	UG/L	---	< 1 U
4-Nitroaniline	UG/L	---	< 1 U
4-Nitrophenol	UG/L	---	< 29 U
Acenaphthene	UG/L	---	< 0.5 U
Acenaphthylene	UG/L	---	< 0.5 U
Acetophenone	UG/L	---	< 1 U
Adamantane	UG/L	---	< 5 U
Aniline	UG/L	---	< 1 U
Anthracene	UG/L	---	< 0.5 U
Benzo (a) anthracene	UG/L	---	< 0.5 U
Benzo (a) pyrene	UG/L	---	< 0.5 U
Benzo (b) fluoranthene	UG/L	---	< 0.5 U
Benzo (g,h,i) perylene	UG/L	---	< 0.5 U
Benzo (k) fluoranthene	UG/L	---	< 0.5 U
Benzoic acid	UG/L	---	< 14 U
Benzyl alcohol	UG/L	---	< 14 U
Bis(2-chloroethoxy)methane	UG/L	---	< 1 U
Bis(2-chloroethyl)ether	UG/L	---	< 1 U
bis(2-Chloroisopropyl)ether	UG/L	---	< 1 U
Bis(2-ethylhexyl)phthalate	UG/L	---	< 5 U
Butyl benzyl phthalate	UG/L	---	< 5 U
Carbazole	UG/L	---	< 1 U
Chlorobenzilate	UG/L	---	< 10 U
Chrysene	UG/L	---	< 0.5 U
Diallate (cis or trans)	UG/L	---	< 5 U
Dibenz (a,h) anthracene	UG/L	---	< 0.5 U
Dibenzofuran	UG/L	---	< 1 U
Diethyl phthalate	UG/L	---	< 5 U
Dimethyl phthalate	UG/L	---	< 5 U
Di-n-butyl phthalate	UG/L	---	< 5 U
Di-n-octyl phthalate	UG/L	---	< 5 U
Dinoseb	UG/L	---	< 5 U
Disulfoton	UG/L	---	< 48 U
d-Limonene	UG/L	---	< 5 U
Fluoranthene	UG/L	---	< 0.5 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER C

Property Owner		PROPERTY OWNER C	PROPERTY OWNER C
Location Description		WELL LOCATED 5 FEET OFF OF NE CORNER OF HOUSE; INACCESSIBLE-WELL HEAD IS BURIED; SAMPLED FROM BASEMENT SPIGOT	WELL LOCATED 5 FEET OFF OF NE CORNER OF HOUSE; INACCESSIBLE-WELL HEAD IS BURIED; SAMPLED FROM BASEMENT SPIGOT
Source Type		WELL	WELL
Well Depth		260	260
Sampled Before Treatment?		Pre-Treatment	Pre-Treatment
Sample ID		0429201113403	1027201120201
Parameter and units	Sample Date	4/29/2011 (Baseline)	10/27/2011
Fluorene	UG/L	---	< 0.5 U
Hexachlorobenzene	UG/L	---	< 0.5 U
Hexachlorobutadiene	UG/L	---	< 1 U
Hexachlorocyclopentadiene	UG/L	---	< 14 U
Hexachloroethane	UG/L	---	< 5 U
Indeno (1,2,3-cd) pyrene	UG/L	---	< 0.5 U
Isophorone	UG/L	---	< 1 U
Naphthalene	UG/L	---	< 0.5 U
Nitrobenzene	UG/L	---	< 1 U
N-Nitrosodiethylamine	UG/L	---	< 1 U
N-Nitrosodimethylamine	UG/L	---	< 5 U
N-Nitrosodi-n-butylamine	UG/L	---	< 5 U
N-Nitrosodi-n-propylamine	UG/L	---	< 1 U
N-Nitrosodiphenylamine	UG/L	---	< 1 U
N-Nitrosomethylethylamine	UG/L	---	< 5 U
Parathion-ethyl	UG/L	---	< 5 U
Parathion-methyl	UG/L	---	< 5 U
Pentachlorobenzene	UG/L	---	< 1 U
Pentachlorophenol	UG/L	---	< 5 U
Phenanthrene	UG/L	---	< 0.5 U
Phenol	UG/L	---	< 1 U
Phorate	UG/L	---	< 1 U
Pronamide	UG/L	---	< 1 U
Pyrene	UG/L	---	< 0.5 U
Pyridine	UG/L	---	< 5 U
Squalene	UG/L	---	< 5 U
Terbufos	UG/L	---	< 5 U
Terpineol	UG/L	---	< 5 U
Tributoxyethyl phosphate	UG/L	---	< 5 U
Trifluralin	UG/L	---	< 5 U
TICs			
1,2,3-Trimethylbenzene	UG/L	---	< 100 U
Volatile Organics			
1,1,1-Trichloroethane	UG/L	---	< 1.00 U
1,1,2-Trichloroethane	UG/L	---	< 1.00 U
1,1-Dichloroethane	UG/L	---	< 1.00 U
1,1-Dichloroethene	UG/L	---	< 1.00 U
1,2,3-Trimethylbenzene	UG/L	---	< 1.00 U
1,2,4-Trichlorobenzene	UG/L	---	---
1,2,4-Trimethylbenzene	UG/L	---	< 1.00 U
1,2-Dibromo-3-chloropropane	UG/L	---	< 0.1009 U
1,2-Dichlorobenzene	UG/L	---	< 1.00 U
1,2-Dichloroethane	UG/L	---	< 1.00 U
1,2-Dichloropropane	UG/L	---	---
1,3,5-Trimethylbenzene	UG/L	---	< 1.00 U
1,3-Dichlorobenzene	UG/L	---	< 1.00 U
1,4-Dichlorobenzene	UG/L	---	< 1.00 U
Acetone	UG/L	---	< 50.0 U
Benzene	UG/L	< 0.500 U	< 1.00 U
Carbon disulfide	UG/L	---	< 1.00 U
Carbon Tetrachloride	UG/L	---	< 1.00 U
Chlorobenzene	UG/L	---	< 1.00 U
Chloroform	UG/L	---	< 1.00 U
cis-1,2-Dichloroethene	UG/L	---	< 1.00 U
Diisopropyl Ether	UG/L	---	< 1.00 U
Ethanol	UG/L	---	< 100 U
Ethyl tert-Butyl Ether	UG/L	---	< 1.00 U
Ethylbenzene	UG/L	< 0.500 U	< 1.00 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER C

Property Owner		PROPERTY OWNER C	PROPERTY OWNER C
Location Description		WELL LOCATED 5 FEET OFF OF NE CORNER OF HOUSE; INACCESSIBLE-WELL HEAD IS BURIED; SAMPLED FROM BASEMENT SPIGOT	WELL LOCATED 5 FEET OFF OF NE CORNER OF HOUSE; INACCESSIBLE-WELL HEAD IS BURIED; SAMPLED FROM BASEMENT SPIGOT
Source Type		WELL	WELL
Well Depth		260	260
Sampled Before Treatment?		Pre-Treatment	Pre-Treatment
Sample ID		0429201113403	1027201120201
Parameter and units	Sample Date	4/29/2011 (Baseline)	10/27/2011
Hexachlorobutadiene	UG/L	---	< 1 U
Isopropyl alcohol	UG/L	---	< 50.0 U
Isopropylbenzene	UG/L	---	< 1.00 U
m,p-Xylene	UG/L	---	< 2.00 U
Methoxychlor	UG/L	---	< 0.0472 U
Methyl tert-Butyl Ether	UG/L	---	< 1.00 U
Methylene Chloride	UG/L	---	< 5.00 U
Naphthalene	UG/L	---	< 5.00 U
o-Xylene	UG/L	---	< 1.00 U
Styrene	UG/L	---	---
Tert-Amyl Methyl Ether	UG/L	---	< 1.00 U
Tertiary Butyl Alcohol	UG/L	---	< 10.0 U
Tetrachloroethene	UG/L	---	< 1.00 U
Tetrahydrofuran	UG/L	---	---
Toluene	UG/L	< 0.500 U	< 1.00 U
trans-1,2-Dichloroethene	UG/L	---	< 1.00 U
Trichloroethene	UG/L	---	< 1.00 U
Vinyl chloride	UG/L	---	< 1.00 U
Xylenes, total	UG/L	< 0.500 U	< 3.00 U

Notes:
U : Parameter not detected at posted limit
< : Parameter not detected at posted limit
ND : Parameter not detected
H : Parameter analyzed beyond method recommended holding time
J : Estimated value
--- : Parameter not analyzed.
B : Blank qualified
ug/L : Micrograms per liter
mg/L : Milligrams per liter
NA : Not Available
NTU : Nephelometric Turbidity Unit
umho/cm : Micromhos per centimeter
colonies/100 ml : Colonies per 100 milliliters

APPENDIX A-4
EPA STUDY WELL DATA
PROPERTY OWNER D

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER D

Property Owner		PROPERTY OWNER D	PROPERTY OWNER D	PROPERTY OWNER D
Location Description				
Source Type		WELL	WELL	WELL
Well Depth		250	250	250
Sampled Before Treatment?		NA	Pre-Treatment	Pre-Treatment
Sample ID		NTA0535-01102010-1600	0610201124603	1028201120201
Parameter and units	Sample Date	1/10/2010 (Baseline)	6/10/2011	10/28/2011
Aldehydes				
Gluteraldehyde	UG/L	---	---	---
Bacteria				
E. coli	colonies/100ml	---	---	Absent
Fecal coliform bacteria	colonies/100ml	---	---	< 1 U
Total Coliform Bacteria	colonies/100ml	---	---	Present
DBCP				
1,2-Dibromo-3-chloropropane	UG/L	---	---	< 0.1014 U
Extractable Petroleum Hydrocarbons				
Diesel	UG/L	---	---	< 95.2 U
General Chemistry				
Alkalinity, Total (CaCO3)	MG/L	---	---	226
Ammonia as N	MG/L	---	---	< 0.100 U
Bicarbonate Alkalinity as CaCO3	MG/L	248	216	221
Bromide	MG/L	---	---	< 2.5 U
Carbonate as CaCO3	MG/L	21.2	55.7	< 10.0 U
Chloride	MG/L	13.2 E	22.3 J	12.6 J
CO2 by Headspace	UG/L	---	---	< 12000 U
Cyanide	MG/L	---	---	---
Fluoride	MG/L	---	---	0.66
MBAS	MG/L	0.0985	< 0.0500 U	< 0.12 U
Nitrate	MG/L	---	---	---
Nitrate Nitrogen	MG/L	---	---	< 0.50 U
Nitrite Nitrogen	MG/L	---	---	< 0.50 UJ
Oil & Grease HEM	MG/L	< 5.81 U	< 6.02 U	< 4.30 U
pH	pH UNITS	8.20 H	8.80 H	8.10 H
Phosphorus	MG/L	---	---	< 0.100 U
Specific conductance	UMHO/CM	532	614	462
Sulfate	MG/L	7.79	5.23	12.1 J
Temperature of pH determination	CELSIUS	21.2 H	23.0 H	21.0 H
Total Dissolved Solids	MG/L	310	335	277
Total Suspended Solids	MG/L	< 1.00 U	< 1.00 U	< 1.00 U
Turbidity	NTU	< 1.00 U	1.74	0.89
Glycols				
1,2-Propylene Glycol	MG/L	---	---	---
Diethylene Glycol	MG/L	---	---	< 10 U
Ethylene Glycol	MG/L	---	---	---
Tetraethylene glycol	MG/L	---	---	< 10 UJ
Triethylene glycol	MG/L	---	---	< 10 U
Light Gases				
Acetylene	MG/L	---	---	< 0.00500 U
Ethane	MG/L	< 0.0260 U	< 0.0260 U	< 0.00500 U
Ethene	MG/L	---	---	< 0.00500 U
Methane	MG/L	3.55	4.81	2.11 J
n-Butane	MG/L	---	---	< 0.00500 U
Propane	MG/L	< 0.0340 U	< 0.0340 U	< 0.00500 U
Low Molecular Weight Acids				
Acetic Acid	UG/L	---	---	< 10000 U
Butyric Acid	UG/L	---	---	< 10000 U
Formic Acid	UG/L	---	---	< 10000 U
Isobutyric acid	UG/L	---	---	< 10000 U
Lactic acid	UG/L	---	---	< 5000 U
Propionic Acid	UG/L	---	---	< 13000 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER D

Property Owner		PROPERTY OWNER D	PROPERTY OWNER D	PROPERTY OWNER D
Location Description				
Source Type		WELL	WELL	WELL
Well Depth		250	250	250
Sampled Before Treatment?		NA	Pre-Treatment	Pre-Treatment
Sample ID		NTA0535-01102010-1600	0610201124603	1028201120201
Parameter and units	Sample Date	1/10/2010 (Baseline)	6/10/2011	10/28/2011
Metals, 6020x				
Cesium	MG/L	---	---	0.00023
Cesium, Dissolved	MG/L	---	---	0.00022
Potassium	MG/L	---	---	1.9
Potassium, Dissolved	MG/L	---	---	1.8
Silicon	MG/L	---	---	5.1
Silicon, Dissolved	MG/L	---	---	5
Thorium	MG/L	---	---	< 0.002 U
Thorium, Dissolved	MG/L	---	---	< 0.002 U
Uranium	MG/L	---	---	< 0.001 U
Uranium, Dissolved	MG/L	---	---	< 0.001 U
Metals, Total				
Aluminum	MG/L	---	---	< 0.0200 U
Antimony	MG/L	---	---	< 0.00200 U
Arsenic	MG/L	< 0.0100 U	< 0.0100 U	< 0.00200 U
Barium	MG/L	0.327	0.297	0.291
Beryllium	MG/L	---	---	< 0.00200 U
Boron	MG/L	---	---	0.234
Cadmium	MG/L	< 0.00100 U	< 0.00100 U	< 0.00100 U
Calcium	MG/L	8.3	11.2	26.8
Chromium	MG/L	< 0.00500 U	< 0.00500 U	< 0.00200 U
Cobalt	MG/L	---	---	< 0.00200 U
Copper	MG/L	---	---	< 0.00500 U
Hardness, CaCO3	MG/L	---	---	---
Iron	MG/L	0.0534	< 0.0500 U	< 0.0500 U
Lead	MG/L	< 0.00500 U	< 0.00500 U	< 0.00200 U
Lithium	MG/L	---	---	---
Magnesium	MG/L	3.72	3.64	8.48
Manganese	MG/L	< 0.0150 U	< 0.0150 U	0.0127
Mercury	MG/L	< 0.000200 U	< 0.000200 U	< 0.000200 U
Molybdenum	MG/L	---	---	< 0.00500 U
Nickel	MG/L	---	---	< 0.00500 U
Potassium	MG/L	1.93	1.53	1.7
Selenium	MG/L	< 0.0100 U	< 0.0100 U	< 0.00200 U
Silver	MG/L	< 0.00500 U	< 0.00500 U	< 0.00200 U
Sodium	MG/L	109	114	65.6
Strontium	MG/L	---	0.672	0.705
Sulfur	MG/L	< 5.000 U	8.09	3.39
Thallium	MG/L	---	---	< 0.00200 U
Titanium	MG/L	---	---	< 0.00200 U
Vanadium	MG/L	---	---	< 0.00400 U
Zinc	MG/L	---	---	< 0.0500 U
Metals, Dissolved				
Aluminum, Dissolved	MG/L	---	---	< 0.0200 U
Antimony, Dissolved	MG/L	---	---	< 0.00200 U
Arsenic, Dissolved	MG/L	---	---	< 0.00200 U
Barium, Dissolved	MG/L	---	---	0.288
Beryllium, Dissolved	MG/L	---	---	< 0.00200 U
Boron, Dissolved	MG/L	---	---	0.239
Cadmium, Dissolved	MG/L	---	---	< 0.00100 U
Calcium, Dissolved	MG/L	---	---	26.2
Chromium, Dissolved	MG/L	---	---	< 0.00200 U
Cobalt, Dissolved	MG/L	---	---	< 0.00200 U
Copper, Dissolved	MG/L	---	---	< 0.00500 U
Iron, Dissolved	MG/L	---	---	< 0.0500 U
Lead, Dissolved	MG/L	---	---	< 0.00200 U
Magnesium, Dissolved	MG/L	---	---	8.24

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER D

Property Owner		PROPERTY OWNER D	PROPERTY OWNER D	PROPERTY OWNER D
Location Description				
Source Type		WELL	WELL	WELL
Well Depth		250	250	250
Sampled Before Treatment?		NA	Pre-Treatment	Pre-Treatment
Sample ID		NTA0535-01102010-1600	0610201124603	1028201120201
Parameter and units	Sample Date	1/10/2010 (Baseline)	6/10/2011	10/28/2011
Manganese, Dissolved	MG/L	---	---	0.0112
Mercury, Dissolved	MG/L	---	---	< 0.000200 U
Molybdenum, Dissolved	MG/L	---	---	< 0.00500 U
Nickel, Dissolved	MG/L	---	---	< 0.00500 U
Potassium, Dissolved	MG/L	---	---	1.69
Selenium, Dissolved	MG/L	---	---	< 0.00200 U
Silver, Dissolved	MG/L	---	---	< 0.00200 U
Sodium, Dissolved	MG/L	---	---	64.6
Strontium, Dissolved	MG/L	---	---	0.694
Sulfur, Dissolved	MG/L	---	---	3.46
Thallium, Dissolved	MG/L	---	---	< 0.00200 U
Titanium, Dissolved	MG/L	---	---	< 0.00200 U
Vanadium, Dissolved	MG/L	---	---	< 0.00400 U
Zinc, Dissolved	MG/L	---	---	< 0.0500 U
Miscellaneous Organics				
Inorganic Carbon, Dissolved	MG/L	---	---	50.6
Organic Carbon, Dissolved	MG/L	---	---	< 1.00 U
Pesticides and PCBs				
4,4'-DDD	UG/L	---	---	< 0.0481 U
4,4'-DDE	UG/L	---	---	< 0.0481 U
4,4'-DDT	UG/L	---	---	< 0.0481 U
Aldrin	UG/L	---	---	< 0.0481 U
alpha-BHC	UG/L	---	---	< 0.0481 U
Azinphos-methyl	UG/L	---	---	< 1.0 UHJ
beta-BHC	UG/L	---	---	< 0.0481 U
Carbaryl	UG/L	---	---	< 6.0 U
delta-BHC	UG/L	---	---	< 0.0481 U
Dichlorvos	UG/L	---	---	< 1.0 UHJ
Dieldrin	UG/L	---	---	< 0.0481 U
Disulfoton	UG/L	---	---	< 1.0 UHJ
Endosulfan I	UG/L	---	---	< 0.0481 U
Endosulfan II	UG/L	---	---	< 0.0481 U
Endosulfan sulfate	UG/L	---	---	< 0.0481 U
Endrin	UG/L	---	---	< 0.0481 U
Endrin aldehyde	UG/L	---	---	< 0.0481 U
Endrin ketone	UG/L	---	---	< 0.0481 U
gamma-BHC (Lindane)	UG/L	---	---	< 0.0481 U
Heptachlor	UG/L	---	---	< 0.0481 U
Heptachlor epoxide	UG/L	---	---	< 0.0481 U
Malathion	UG/L	---	---	< 1.0 UHJ
Methoxychlor	UG/L	---	---	< 0.0481 U
Mevinphos	UG/L	---	---	< 1.0 UHJ
Purgeable Petroleum Hydrocarbons				
GRO as Gasoline	UG/L	---	---	< 100 U
Semivolatile Organics				
1,2,4,5-Tetrachlorobenzene	UG/L	---	---	< 1 U
1,2-Dinitrobenzene	UG/L	---	---	< 5 U
1,2-Diphenylhydrazine	UG/L	---	---	< 1 U
1,3-Dimethyl adamatane	UG/L	---	---	< 5 U
1,3-Dinitrobenzene	UG/L	---	---	< 5 U
1,4-Dinitrobenzene	UG/L	---	---	< 5 U
1-Chloronaphthalene	UG/L	---	---	< 1 U
2,3,4,6-Tetrachlorophenol	UG/L	---	---	< 1 U
2,4,5-Trichlorophenol	UG/L	---	---	< 1 U
2,4,6-Trichlorophenol	UG/L	---	---	< 1 U
2,4-Dichlorophenol	UG/L	---	---	< 1 U
2,4-Dimethylphenol	UG/L	---	---	< 1 U
2,4-Dinitrophenol	UG/L	---	---	< 29 U
2,4-Dinitrotoluene	UG/L	---	---	< 5 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER D

Property Owner		PROPERTY OWNER D	PROPERTY OWNER D	PROPERTY OWNER D
Location Description				
Source Type		WELL	WELL	WELL
Well Depth		250	250	250
Sampled Before Treatment?		NA	Pre-Treatment	Pre-Treatment
Sample ID		NTA0535-01102010-1600	0610201124603	1028201120201
Parameter and units	Sample Date	1/10/2010 (Baseline)	6/10/2011	10/28/2011
2,6-Dichlorophenol	UG/L	---	---	< 1 U
2,6-Dinitrotoluene	UG/L	---	---	< 1 U
2-Butoxyethanol	UG/L	---	---	< 5 UJ
2-Chloronaphthalene	UG/L	---	---	< 1 U
2-Chlorophenol	UG/L	---	---	< 1 U
2-Methylnaphthalene	UG/L	---	---	< 0.5 U
2-Methylphenol	UG/L	---	---	< 1 U
2-Nitroaniline	UG/L	---	---	< 1 U
2-Nitrophenol	UG/L	---	---	< 1 U
3,3-Dichlorobenzidine	UG/L	---	---	< 5 U
3-Nitroaniline	UG/L	---	---	< 1 U
4,4'-Methylenebis(2-chloroaniline)	UG/L	---	---	< 14 U
4,4'-Methylenebis(N,N-dimethylanilin	UG/L	---	---	< 14 UJ
4,6-Dinitro-2-methylphenol	UG/L	---	---	< 14 U
4-Bromophenyl phenyl ether	UG/L	---	---	< 1 U
4-Chloro-3-methylphenol	UG/L	---	---	< 1 U
4-Chloroaniline	UG/L	---	---	< 1 U
4-Chlorophenyl phenyl ether	UG/L	---	---	< 1 U
4-Methylphenol	UG/L	---	---	< 1 U
4-Nitroaniline	UG/L	---	---	< 1 UJ
4-Nitrophenol	UG/L	---	---	< 29 U
Acenaphthene	UG/L	---	---	< 0.5 U
Acenaphthylene	UG/L	---	---	< 0.5 U
Acetophenone	UG/L	---	---	< 1 U
Adamantane	UG/L	---	---	< 5 U
Aniline	UG/L	---	---	< 1 U
Anthracene	UG/L	---	---	< 0.5 U
Benzo (a) anthracene	UG/L	---	---	< 0.5 U
Benzo (a) pyrene	UG/L	---	---	< 0.5 U
Benzo (b) fluoranthene	UG/L	---	---	< 0.5 U
Benzo (g,h,i) perylene	UG/L	---	---	< 0.5 U
Benzo (k) fluoranthene	UG/L	---	---	< 0.5 U
Benzoic acid	UG/L	---	---	< 14 U
Benzyl alcohol	UG/L	---	---	< 14 U
Bis(2-chloroethoxy)methane	UG/L	---	---	< 1 U
Bis(2-chloroethyl)ether	UG/L	---	---	< 1 U
bis(2-Chloroisopropyl)ether	UG/L	---	---	< 1 U
Bis(2-ethylhexyl)phthalate	UG/L	---	---	< 5 U
Butyl benzyl phthalate	UG/L	---	---	< 5 U
Carbazole	UG/L	---	---	< 1 U
Chlorobenzilate	UG/L	---	---	< 10 U
Chrysene	UG/L	---	---	< 0.5 U
Diallate (cis or trans)	UG/L	---	---	< 5 U
Dibenz (a,h) anthracene	UG/L	---	---	< 0.5 U
Dibenzofuran	UG/L	---	---	< 1 U
Diethyl phthalate	UG/L	---	---	< 5 U
Dimethyl phthalate	UG/L	---	---	< 5 U
Di-n-butyl phthalate	UG/L	---	---	< 5 U
Di-n-octyl phthalate	UG/L	---	---	< 5 U
Dinoseb	UG/L	---	---	< 5 U
Disulfoton	UG/L	---	---	< 48 U
d-Limonene	UG/L	---	---	< 5 U
Fluoranthene	UG/L	---	---	< 0.5 U
Fluorene	UG/L	---	---	< 0.5 U
Hexachlorobenzene	UG/L	---	---	< 0.5 U
Hexachlorobutadiene	UG/L	---	---	< 1 U
Hexachlorocyclopentadiene	UG/L	---	---	< 14 U
Hexachloroethane	UG/L	---	---	< 5 U
Indeno (1,2,3-cd) pyrene	UG/L	---	---	< 0.5 U
Isophorone	UG/L	---	---	< 1 U
Naphthalene	UG/L	---	---	< 0.5 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER D

Property Owner		PROPERTY OWNER D	PROPERTY OWNER D	PROPERTY OWNER D
Location Description				
Source Type		WELL	WELL	WELL
Well Depth		250	250	250
Sampled Before Treatment?		NA	Pre-Treatment	Pre-Treatment
Sample ID		NTA0535-01102010-1600	0610201124603	1028201120201
Parameter and units	Sample Date	1/10/2010 (Baseline)	6/10/2011	10/28/2011
Nitrobenzene	UG/L	---	---	< 1 U
N-Nitrosodiethylamine	UG/L	---	---	< 1 U
N-Nitrosodimethylamine	UG/L	---	---	< 5 U
N-Nitrosodi-n-butylamine	UG/L	---	---	< 5 U
N-Nitrosodi-n-propylamine	UG/L	---	---	< 1 U
N-Nitrosodiphenylamine	UG/L	---	---	< 1 U
N-Nitrosomethylethylamine	UG/L	---	---	< 5 U
Parathion-ethyl	UG/L	---	---	< 5 U
Parathion-methyl	UG/L	---	---	< 5 U
Pentachlorobenzene	UG/L	---	---	< 1 U
Pentachlorophenol	UG/L	---	---	< 5 UJ
Phenanthrene	UG/L	---	---	< 0.5 U
Phenol	UG/L	---	---	< 1 U
Phorate	UG/L	---	---	< 1 U
Pronamide	UG/L	---	---	< 1 U
Pyrene	UG/L	---	---	< 0.5 U
Pyridine	UG/L	---	---	< 5 U
Squalene	UG/L	---	---	< 5 UJ
Terbufos	UG/L	---	---	< 5 U
Terpineol	UG/L	---	---	< 5 U
Tributoxyethyl phosphate	UG/L	---	---	< 5 UJ
Trifluralin	UG/L	---	---	< 5 U
TICs				
1,2,3-Trimethylbenzene	UG/L	---	---	---
Volatile Organics				
1,1,1-Trichloroethane	UG/L	---	---	< 1.00 U
1,1,2-Trichloroethane	UG/L	---	---	< 1.00 U
1,1-Dichloroethane	UG/L	---	---	< 1.00 U
1,1-Dichloroethene	UG/L	---	---	< 1.00 U
1,2,3-Trimethylbenzene	UG/L	---	---	< 1.00 U
1,2,4-Trichlorobenzene	UG/L	---	---	---
1,2,4-Trimethylbenzene	UG/L	---	---	< 1.00 U
1,2-Dibromo-3-chloropropane	UG/L	---	---	< 0.1014 U
1,2-Dichlorobenzene	UG/L	---	---	< 1.00 U
1,2-Dichloroethane	UG/L	---	---	< 1.00 U
1,2-Dichloropropane	UG/L	---	---	---
1,3,5-Trimethylbenzene	UG/L	---	---	< 1.00 U
1,3-Dichlorobenzene	UG/L	---	---	< 1.00 U
1,4-Dichlorobenzene	UG/L	---	---	< 1.00 U
Acetone	UG/L	---	---	< 50.0 U
Benzene	UG/L	< 0.500 U	< 0.500 U	< 1.00 U
Carbon disulfide	UG/L	---	---	< 1.00 U
Carbon Tetrachloride	UG/L	---	---	< 1.00 U
Chlorobenzene	UG/L	---	---	< 1.00 U
Chloroform	UG/L	---	---	< 1.00 U
cis-1,2-Dichloroethene	UG/L	---	---	< 1.00 U
Diisopropyl Ether	UG/L	---	---	< 1.00 U
Ethanol	UG/L	---	---	< 100 U
Ethyl tert-Butyl Ether	UG/L	---	---	< 1.00 U
Ethylbenzene	UG/L	< 0.500 U	< 0.500 U	< 1.00 U
Hexachlorobutadiene	UG/L	---	---	< 1 U
Isopropyl alcohol	UG/L	---	---	< 50.0 U
Isopropylbenzene	UG/L	---	---	< 1.00 U
m,p-Xylene	UG/L	---	---	< 2.00 U
Methoxychlor	UG/L	---	---	< 0.0481 U
Methyl tert-Butyl Ether	UG/L	---	---	< 1.00 U
Methylene Chloride	UG/L	---	---	< 5.00 U
Naphthalene	UG/L	---	---	< 5.00 U
o-Xylene	UG/L	---	---	< 1.00 U
Styrene	UG/L	---	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER D

Property Owner		PROPERTY OWNER D	PROPERTY OWNER D	PROPERTY OWNER D
Location Description				
Source Type		WELL	WELL	WELL
Well Depth		250	250	250
Sampled Before Treatment?		NA	Pre-Treatment	Pre-Treatment
Sample ID		NTA0535-01102010-1600	0610201124603	1028201120201
Parameter and units	Sample Date	1/10/2010 (Baseline)	6/10/2011	10/28/2011
Tert-Amyl Methyl Ether	UG/L	---	---	< 1.00 U
Tertiary Butyl Alcohol	UG/L	---	---	< 10.0 U
Tetrachloroethene	UG/L	---	---	< 1.00 U
Tetrahydrofuran	UG/L	---	---	---
Toluene	UG/L	< 0.500 U	< 0.500 U	< 1.00 U
trans-1,2-Dichloroethene	UG/L	---	---	< 1.00 U
Trichloroethene	UG/L	---	---	< 1.00 U
Vinyl chloride	UG/L	---	---	< 1.00 U
Xylenes, total	UG/L	< 0.500 U	< 0.500 U	< 3.00 U

Notes:
U : Parameter not detected at posted limit
< : Parameter not detected at posted limit
ND : Parameter not detected
H : Parameter analyzed beyond method recommended holding time
J : Estimated value
--- : Parameter not analyzed.
B : Blank qualified
ug/L : Micrograms per liter
mg/L : Milligrams per liter
NA : Not Available
NTU : Nephelometric Turbidity Unit
umho/cm : Micromhos per centimeter
colonies/100 ml : Colonies per 100 millileters

APPENDIX A-5
EPA STUDY WELL DATA
PROPERTY OWNER E

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER E

Property Owner		PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E
Location Description		WELL IS LOCATED NORTH OF BARN.		WELL IS LOCATED NORTH OF BARN.	WELL IS LOCATED NORTH OF BARN.	WELL IS LOCATED NORTH OF BARN.		WELL IS LOCATED IN BUSHES IN FRONT OF HOUSE.	WELL IS LOCATED IN BUSHES IN FRONT OF HOUSE.
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		115	115	115	115	185	185	185	185
Sampled Before Treatment?		NA	NA	NA	NA	NA	NA	Pre-Treatment	Pre-Treatment
Sample ID		NTD0308-04012010-1625	NTH1162-PROPERTY OWNER E 002	0108201150103	1104201120206	NTD0293-04012010-1545	NTH1160-PROPERTY OWNER E 001	0108201150101	1104201120204
Parameter and units	Sample Date	4/1/2010 (Baseline)	8/12/2010	1/8/2011	11/4/2011	4/1/2010 (Baseline)	8/12/2010	1/8/2011	11/4/2011
Aldehydes									
Gluteraldehyde	UG/L	---	---	---	---	---	---	---	---
Bacteria									
E. coli	colonies/100ml	---	---	---	Absent	---	---	---	Absent
Fecal coliform bacteria	colonies/100ml	---	---	---	< 1 U	---	---	---	< 1 U
Total Coliform Bacteria	colonies/100ml	---	---	---	Absent	---	---	---	Absent
DBCP									
1,2-Dibromo-3-chloropropane	UG/L	---	---	---	< 0.1012 U	---	---	---	< 0.1003 U
Extractable Petroleum Hydrocarbons									
Diesel	UG/L	---	---	---	< 94.3 U	---	---	---	< 94.3 U
General Chemistry									
Alkalinity, Total (CaCO3)	MG/L	---	---	---	119	---	---	---	129
Ammonia as N	MG/L	---	---	---	1.09	---	---	---	0.503
Bicarbonate Alkalinity as CaCO3	MG/L	134	125	118	118	147	131 H2	128	126
Bromide	MG/L	---	---	---	< 2.5 U	---	---	---	< 2.5 U
Carbonate as CaCO3	MG/L	< 10.0 U	ND	< 10 U	< 10.0 U	< 10.0 U	ND H2	< 10 U	< 10.0 U
Chloride	MG/L	31.4	32.4	30.2	30.8 J	20.1	21.2	8.4	17.4 J
CO2 by Headspace	UG/L	---	---	---	< 12000 U	---	---	---	< 12000 U
Cyanide	MG/L	---	---	---	---	---	---	---	---
Fluoride	MG/L	---	---	---	< 0.50 U	---	---	---	< 0.50 U
MBAS	MG/L	< 0.0500 U	ND	< 0.05 UJH	< 0.12 U	< 0.0500 U	ND	< 0.05 UJH	< 0.12 U
Nitrate	MG/L	---	---	---	---	---	---	---	---
Nitrate Nitrogen	MG/L	---	---	---	< 0.50 U	---	---	---	2.3
Nitrite Nitrogen	MG/L	---	---	---	< 0.50 U	---	---	---	< 0.50 U
Oil & Grease HEM	MG/L	< 5.75 U	ND	< 5.56 U	< 5.56 U	< 5.75 U	ND	< 6.33 U	< 5.00 U
pH	pH UNITS	7.70 H	7.90 HTI	8.3 JH	7.90 H	7.70 H	7.80 HTI	8.1 JH	7.50 H
Phosphorus	MG/L	---	---	---	< 0.100 U	---	---	---	< 0.100 U
Specific conductance	UMHO/CM	331	329	375	319	328	321	334	306
Sulfate	MG/L	< 1.00 U	ND	< 5 U	< 5.0 U	5.43	6.26	13.8	12.1
Temperature of pH determination	CELSIUS	23.1 H	22.8 HTI	22.3 H	21.0 H	22.9 H	22.8 HTI	22 H	21.0 H
Total Dissolved Solids	MG/L	194	182	178	176	192	178	171	152 J
Total Suspended Solids	MG/L	< 1.00 U	ND	< 1 U	< 1.00 U	< 1.00 U	ND	1.1	2.2
Turbidity	NTU	< 1.00 U	ND	< 1 UJH	< 0.30 U	1.7	1.4	1.8 JH	4.9
Glycols									
1,2-Propylene Glycol	MG/L	---	---	---	---	---	---	---	---
Diethylene Glycol	MG/L	---	---	---	13 JB	---	---	---	< 10 U
Ethylene Glycol	MG/L	---	---	---	---	---	---	---	---
Tetraethylene glycol	MG/L	---	---	---	26 JBJ	---	---	---	< 10 UJ
Triethylene glycol	MG/L	---	---	---	20 JB	---	---	---	< 10 U
Light Gases									
Acetylene	MG/L	---	---	---	< 0.00500 U	---	---	---	< 0.00500 U
Ethane	MG/L	0.049	0.0495	0.0838	0.0816	< 0.0260 U	ND	< 0.026 U	< 0.00500 U
Ethene	MG/L	---	---	---	< 0.00500 U	---	---	---	< 0.00500 U
Methane	MG/L	33.8	34.7	35.8	37.1 J	8.88	9.68	0.239	0.609
n-Butane	MG/L	---	---	---	< 0.00500 U	---	---	---	< 0.00500 U
Propane	MG/L	< 0.0340 U	ND	< 0.034 U	< 0.00500 U	< 0.0340 U	ND	< 0.034 U	< 0.00500 U
Low Molecular Weight Acids									
Acetic Acid	UG/L	---	---	---	< 10000 U	---	---	---	< 10000 U
Butyric Acid	UG/L	---	---	---	< 10000 U	---	---	---	< 10000 U
Formic Acid	UG/L	---	---	---	< 10000 U	---	---	---	< 10000 U
Isobutyric acid	UG/L	---	---	---	< 10000 U	---	---	---	< 10000 U
Lactic acid	UG/L	---	---	---	< 5000 U	---	---	---	< 5000 U
Propionic Acid	UG/L	---	---	---	< 13000 U	---	---	---	< 13000 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER E

Property Owner		PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E
Location Description		WELL IS LOCATED NORTH OF BARN.		WELL IS LOCATED NORTH OF BARN.	WELL IS LOCATED NORTH OF BARN.	WELL IS LOCATED NORTH OF BARN.		WELL IS LOCATED IN BUSHES IN FRONT OF HOUSE.	WELL IS LOCATED IN BUSHES IN FRONT OF HOUSE.
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		115	115	115	115	185	185	185	185
Sampled Before Treatment?		NA	NA	NA	NA	NA	NA	Pre-Treatment	Pre-Treatment
Sample ID		NTD0308-04012010-1625	NTH1162-PROPERTY OWNER E 002	0108201150103	1104201120206	NTD0293-04012010-1545	NTH1160-PROPERTY OWNER E 001	0108201150101	1104201120204
Parameter and units	Sample Date	4/1/2010 (Baseline)	8/12/2010	1/8/2011	11/4/2011	4/1/2010 (Baseline)	8/12/2010	1/8/2011	11/4/2011
Metals, 6020x									
Cesium	MG/L	---	---	---	< 0.1 U	---	---	---	< 0.1 U
Cesium, Dissolved	MG/L	---	---	---	< 0.1 U	---	---	---	< 0.1 U
Potassium	MG/L	---	---	---	< 100 U	---	---	---	< 100 U
Potassium, Dissolved	MG/L	---	---	---	< 100 U	---	---	---	< 100 U
Silicon	MG/L	---	---	---	< 2500 U	---	---	---	< 2500 U
Silicon, Dissolved	MG/L	---	---	---	< 2500 U	---	---	---	< 2500 U
Thorium	MG/L	---	---	---	< 2 U	---	---	---	< 2 U
Thorium, Dissolved	MG/L	---	---	---	< 2 U	---	---	---	< 2 U
Uranium	MG/L	---	---	---	< 1 U	---	---	---	< 1 U
Uranium, Dissolved	MG/L	---	---	---	< 1 U	---	---	---	< 1 U
Metals, Total									
Aluminum	MG/L	---	---	---	< 0.0200 U	---	---	---	0.0424
Antimony	MG/L	---	---	---	< 0.00200 U	---	---	---	< 0.00200 U
Arsenic	MG/L	< 0.0100 U	ND	< 0.01 U	< 0.00200 U	< 0.0100 U	ND	< 0.01 U	< 0.00200 U
Barium	MG/L	0.965	1	1.04	0.947	0.36	0.352	0.278	0.28
Beryllium	MG/L	---	---	---	< 0.00200 U	---	---	---	< 0.00200 U
Boron	MG/L	---	---	---	0.063	---	---	---	< 0.0500 U
Cadmium	MG/L	< 0.00100 U	ND	< 0.001 U	< 0.00100 U	< 0.00100 U	ND	< 0.001 U	< 0.00100 U
Calcium	MG/L	28.7	28.4	29.7	30.2	30.6	30.1	41.6	43.9
Chromium	MG/L	< 0.00500 U	ND	< 0.005 U	< 0.00200 U	< 0.00500 U	ND	< 0.005 U	< 0.00200 U
Cobalt	MG/L	---	---	---	< 0.00200 U	---	---	---	< 0.00200 U
Copper	MG/L	---	---	---	< 0.00500 U	---	---	---	0.00776
Hardness, CaCO3	MG/L	---	---	---	---	---	---	---	---
Iron	MG/L	0.0629	0.106	< 0.05 U	< 0.0500 U	< 0.0500 U	ND	< 0.05 U	0.069
Lead	MG/L	< 0.00500 U	ND	< 0.005 U	< 0.00200 U	< 0.00500 U	ND	< 0.005 U	< 0.00200 U
Lithium	MG/L	---	---	---	---	---	---	---	---
Magnesium	MG/L	2.92	3.02	3.15	3.16	4.01	4.17	5.58	5.73
Manganese	MG/L	0.118	0.127	0.133	0.116	0.0647	0.0788	< 0.015 U	0.021
Mercury	MG/L	< 0.000200 U	ND	< 0.0002 U	< 0.000200 U	< 0.000200 U	ND	< 0.0002 U	< 0.000200 U
Molybdenum	MG/L	---	---	---	< 0.00500 U	---	---	---	< 0.00500 U
Nickel	MG/L	---	---	---	< 0.00500 U	---	---	---	< 0.00500 U
Potassium	MG/L	1.09	1.2	1.32	1.16	< 1.00 U	1.02	1.03	< 1.00 U
Selenium	MG/L	< 0.0100 U	ND	< 0.01 U	< 0.00200 U	< 0.0100 U	ND	< 0.01 U	< 0.00200 U
Silver	MG/L	< 0.00500 U	ND	< 0.005 U	< 0.00200 U	< 0.00500 U	ND	< 0.005 U	< 0.00200 U
Sodium	MG/L	34	36.2	37.1	35.5	27.7	32.9 MHA	15.6	15
Strontium	MG/L	---	---	---	0.857	---	---	---	0.577
Sulfur	MG/L	< 5.000 U	ND	< 0.5 U	< 0.500 U	< 5.000 U	6.4	2.99	3.03
Thallium	MG/L	---	---	---	< 0.00200 U	---	---	---	< 0.00200 U
Titanium	MG/L	---	---	---	< 0.00200 U	---	---	---	< 0.00200 U
Vanadium	MG/L	---	---	---	< 0.00400 U	---	---	---	< 0.00400 U
Zinc	MG/L	---	---	---	< 0.0500 U	---	---	---	< 0.0500 U
Metals, Dissolved									
Aluminum, Dissolved	MG/L	---	---	---	< 0.0200 U	---	---	---	< 0.0200 U
Antimony, Dissolved	MG/L	---	---	---	< 0.00200 U	---	---	---	< 0.00200 U
Arsenic, Dissolved	MG/L	---	---	---	< 0.00200 U	---	---	---	< 0.00200 U
Barium, Dissolved	MG/L	---	---	---	0.938	---	---	---	0.273
Beryllium, Dissolved	MG/L	---	---	---	< 0.00200 U	---	---	---	< 0.00200 U
Boron, Dissolved	MG/L	---	---	---	0.0636	---	---	---	< 0.0500 U
Cadmium, Dissolved	MG/L	---	---	---	< 0.00100 U	---	---	---	< 0.00100 U
Calcium, Dissolved	MG/L	---	---	---	28.7	---	---	---	42.6
Chromium, Dissolved	MG/L	---	---	---	< 0.00200 U	---	---	---	< 0.00200 U
Cobalt, Dissolved	MG/L	---	---	---	< 0.00200 U	---	---	---	< 0.00200 U
Copper, Dissolved	MG/L	---	---	---	< 0.00500 U	---	---	---	< 0.00500 U
Iron, Dissolved	MG/L	---	---	---	< 0.0500 U	---	---	---	< 0.0500 U
Lead, Dissolved	MG/L	---	---	---	< 0.00200 U	---	---	---	< 0.00200 U
Magnesium, Dissolved	MG/L	---	---	---	2.98	---	---	---	5.51

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER E

Property Owner		PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E
Location Description		WELL IS LOCATED NORTH OF BARN.		WELL IS LOCATED NORTH OF BARN.	WELL IS LOCATED NORTH OF BARN.	WELL IS LOCATED NORTH OF BARN.		WELL IS LOCATED IN BUSHES IN FRONT OF HOUSE.	WELL IS LOCATED IN BUSHES IN FRONT OF HOUSE.
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		115	115	115	115	185	185	185	185
Sampled Before Treatment?		NA	NA	NA	NA	NA	NA	Pre-Treatment	Pre-Treatment
Sample ID		NTD0308-04012010-1625	NTH1162-PROPERTY OWNER E 002	0108201150103	1104201120206	NTD0293-04012010-1545	NTH1160-PROPERTY OWNER E 001	0108201150101	1104201120204
Parameter and units	Sample Date	4/1/2010 (Baseline)	8/12/2010	1/8/2011	11/4/2011	4/1/2010 (Baseline)	8/12/2010	1/8/2011	11/4/2011
Manganese, Dissolved	MG/L	---	---	---	0.113	---	---	---	0.017
Mercury, Dissolved	MG/L	---	---	---	< 0.000200 U	---	---	---	< 0.000200 U
Molybdenum, Dissolved	MG/L	---	---	---	< 0.00500 U	---	---	---	< 0.00500 U
Nickel, Dissolved	MG/L	---	---	---	< 0.00500 U	---	---	---	< 0.00500 U
Potassium, Dissolved	MG/L	---	---	---	1.14	---	---	---	< 1.00 U
Selenium, Dissolved	MG/L	---	---	---	< 0.00200 U	---	---	---	< 0.00200 U
Silver, Dissolved	MG/L	---	---	---	< 0.00200 U	---	---	---	< 0.00200 U
Sodium, Dissolved	MG/L	---	---	---	34.5 J	---	---	---	15
Strontium, Dissolved	MG/L	---	---	---	0.806	---	---	---	0.559
Sulfur, Dissolved	MG/L	---	---	---	< 0.500 U	---	---	---	2.94
Thallium, Dissolved	MG/L	---	---	---	< 0.00200 U	---	---	---	< 0.00200 U
Titanium, Dissolved	MG/L	---	---	---	< 0.00200 U	---	---	---	< 0.00200 U
Vanadium, Dissolved	MG/L	---	---	---	< 0.00400 U	---	---	---	< 0.00400 U
Zinc, Dissolved	MG/L	---	---	---	< 0.0500 U	---	---	---	< 0.0500 U
Miscellaneous Organics									
Inorganic Carbon, Dissolved	MG/L	---	---	---	25.5	---	---	---	27.9
Organic Carbon, Dissolved	MG/L	---	---	---	< 1.00 U	---	---	---	< 1.00 U
Pesticides and PCBs									
4,4'-DDD	UG/L	---	---	---	< 0.0236 U	---	---	---	< 0.0236 U
4,4'-DDE	UG/L	---	---	---	< 0.0236 U	---	---	---	< 0.0236 U
4,4'-DDT	UG/L	---	---	---	< 0.0236 U	---	---	---	< 0.0236 U
Aldrin	UG/L	---	---	---	< 0.0236 U	---	---	---	< 0.0236 U
alpha-BHC	UG/L	---	---	---	< 0.0236 U	---	---	---	< 0.0236 U
Azinphos-methyl	UG/L	---	---	---	< 0.96 U	---	---	---	< 0.96 U
beta-BHC	UG/L	---	---	---	< 0.0236 U	---	---	---	< 0.0236 U
Carbaryl	UG/L	---	---	---	< 6.0 U	---	---	---	< 6.0 U
delta-BHC	UG/L	---	---	---	< 0.0236 U	---	---	---	< 0.0236 U
Dichlorvos	UG/L	---	---	---	< 0.96 U	---	---	---	< 0.96 U
Dieldrin	UG/L	---	---	---	< 0.0236 U	---	---	---	< 0.0236 U
Disulfoton	UG/L	---	---	---	< 0.96 U	---	---	---	< 0.96 U
Endosulfan I	UG/L	---	---	---	< 0.0236 U	---	---	---	< 0.0236 U
Endosulfan II	UG/L	---	---	---	< 0.0236 U	---	---	---	< 0.0236 U
Endosulfan sulfate	UG/L	---	---	---	< 0.0236 U	---	---	---	< 0.0236 U
Endrin	UG/L	---	---	---	< 0.0236 U	---	---	---	< 0.0236 U
Endrin aldehyde	UG/L	---	---	---	< 0.0236 U	---	---	---	< 0.0236 U
Endrin ketone	UG/L	---	---	---	< 0.0236 U	---	---	---	< 0.0236 U
gamma-BHC (Lindane)	UG/L	---	---	---	< 0.0236 U	---	---	---	< 0.0236 U
Heptachlor	UG/L	---	---	---	< 0.0236 U	---	---	---	< 0.0236 U
Heptachlor epoxide	UG/L	---	---	---	< 0.0236 U	---	---	---	< 0.0236 U
Malathion	UG/L	---	---	---	< 0.96 U	---	---	---	< 0.96 U
Methoxychlor	UG/L	---	---	---	< 0.0236 U	---	---	---	< 0.0236 U
Mevinphos	UG/L	---	---	---	< 0.96 U	---	---	---	< 0.96 U
Purgeable Petroleum Hydrocarbons									
GRO as Gasoline	UG/L	---	---	---	< 100 U	---	---	---	< 100 U
Semivolatile Organics									
1,2,4,5-Tetrachlorobenzene	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
1,2-Dinitrobenzene	UG/L	---	---	---	< 5 U	---	---	---	< 5 U
1,2-Diphenylhydrazine	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
1,3-Dimethyl adamatane	UG/L	---	---	---	< 5 U	---	---	---	< 5 U
1,3-Dinitrobenzene	UG/L	---	---	---	< 5 U	---	---	---	< 5 U
1,4-Dinitrobenzene	UG/L	---	---	---	< 5 U	---	---	---	< 5 U
1-Chloronaphthalene	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
2,3,4,6-Tetrachlorophenol	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
2,4,5-Trichlorophenol	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
2,4,6-Trichlorophenol	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
2,4-Dichlorophenol	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
2,4-Dimethylphenol	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
2,4-Dinitrophenol	UG/L	---	---	---	< 29 U	---	---	---	< 28 U
2,4-Dinitrotoluene	UG/L	---	---	---	< 5 U	---	---	---	< 5 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER E

Property Owner		PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E
Location Description		WELL IS LOCATED NORTH OF BARN.		WELL IS LOCATED NORTH OF BARN.	WELL IS LOCATED NORTH OF BARN.	WELL IS LOCATED NORTH OF BARN.		WELL IS LOCATED IN BUSHES IN FRONT OF HOUSE.	WELL IS LOCATED IN BUSHES IN FRONT OF HOUSE.
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		115	115	115	115	185	185	185	185
Sampled Before Treatment?		NA	NA	NA	NA	NA	NA	Pre-Treatment	Pre-Treatment
Sample ID		NTD0308-04012010-1625	NTH1162-PROPERTY OWNER E 002	0108201150103	1104201120206	NTD0293-04012010-1545	NTH1160-PROPERTY OWNER E 001	0108201150101	1104201120204
Parameter and units	Sample Date	4/1/2010 (Baseline)	8/12/2010	1/8/2011	11/4/2011	4/1/2010 (Baseline)	8/12/2010	1/8/2011	11/4/2011
2,6-Dichlorophenol	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
2,6-Dinitrotoluene	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
2-Butoxyethanol	UG/L	---	---	---	< 5 UJ	---	---	---	< 5 UJ
2-Chloronaphthalene	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
2-Chlorophenol	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
2-Methylnaphthalene	UG/L	---	---	---	< 0.5 U	---	---	---	< 0.5 U
2-Methylphenol	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
2-Nitroaniline	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
2-Nitrophenol	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
3,3-Dichlorobenzidine	UG/L	---	---	---	< 5 U	---	---	---	< 5 U
3-Nitroaniline	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
4,4'-Methylenebis(2-chloroaniline)	UG/L	---	---	---	< 14 UJ	---	---	---	< 14 UJ
4,4'-Methylenebis(N,N-dimethylanilin	UG/L	---	---	---	< 14 UJ	---	---	---	< 14 UJ
4,6-Dinitro-2-methylphenol	UG/L	---	---	---	< 14 U	---	---	---	< 14 U
4-Bromophenyl phenyl ether	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
4-Chloro-3-methylphenol	UG/L	---	---	---	< 1 UJ	---	---	---	< 0.9 UJ
4-Chloroaniline	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
4-Chlorophenyl phenyl ether	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
4-Methylphenol	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
4-Nitroaniline	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
4-Nitrophenol	UG/L	---	---	---	< 29 U	---	---	---	< 28 U
Acenaphthene	UG/L	---	---	---	< 0.5 U	---	---	---	< 0.5 U
Acenaphthylene	UG/L	---	---	---	< 0.5 U	---	---	---	< 0.5 U
Acetophenone	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
Adamantane	UG/L	---	---	---	< 5 U	---	---	---	< 5 U
Aniline	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
Anthracene	UG/L	---	---	---	< 0.5 U	---	---	---	< 0.5 U
Benzo (a) anthracene	UG/L	---	---	---	< 0.5 UJ	---	---	---	< 0.5 UJ
Benzo (a) pyrene	UG/L	---	---	---	< 0.5 U	---	---	---	< 0.5 U
Benzo (b) fluoranthene	UG/L	---	---	---	< 0.5 U	---	---	---	< 0.5 U
Benzo (g,h,i) perylene	UG/L	---	---	---	< 0.5 U	---	---	---	< 0.5 U
Benzo (k) fluoranthene	UG/L	---	---	---	< 0.5 U	---	---	---	< 0.5 U
Benzoic acid	UG/L	---	---	---	< 14 UJ	---	---	---	< 14 UJ
Benzyl alcohol	UG/L	---	---	---	< 14 U	---	---	---	< 14 U
Bis(2-chloroethoxy)methane	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
Bis(2-chloroethyl)ether	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
bis(2-Chloroisopropyl)ether	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
Bis(2-ethylhexyl)phthalate	UG/L	---	---	---	< 5 UJ	---	---	---	< 5 UJ
Butyl benzyl phthalate	UG/L	---	---	---	< 5 UJ	---	---	---	< 5 UJ
Carbazole	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
Chlorobenzilate	UG/L	---	---	---	< 10 U	---	---	---	< 9 U
Chrysene	UG/L	---	---	---	< 0.5 UJ	---	---	---	< 0.5 UJ
Diallate (cis or trans)	UG/L	---	---	---	< 5 U	---	---	---	< 5 U
Dibenz (a,h) anthracene	UG/L	---	---	---	< 0.5 U	---	---	---	< 0.5 U
Dibenzofuran	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
Diethyl phthalate	UG/L	---	---	---	< 5 U	---	---	---	< 5 U
Dimethyl phthalate	UG/L	---	---	---	< 5 U	---	---	---	< 5 U
Di-n-butyl phthalate	UG/L	---	---	---	< 5 U	---	---	---	< 5 U
Di-n-octyl phthalate	UG/L	---	---	---	< 5 U	---	---	---	< 5 U
Dinoseb	UG/L	---	---	---	< 5 U	---	---	---	< 5 U
Disulfoton	UG/L	---	---	---	< 48 U	---	---	---	< 47 U
d-Limonene	UG/L	---	---	---	< 5 U	---	---	---	< 5 U
Fluoranthene	UG/L	---	---	---	< 0.5 U	---	---	---	< 0.5 U
Fluorene	UG/L	---	---	---	< 0.5 U	---	---	---	< 0.5 U
Hexachlorobenzene	UG/L	---	---	---	< 0.5 U	---	---	---	< 0.5 U
Hexachlorobutadiene	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
Hexachlorocyclopentadiene	UG/L	---	---	---	< 14 U	---	---	---	< 14 U
Hexachloroethane	UG/L	---	---	---	< 5 U	---	---	---	< 5 U
Indeno (1,2,3-cd) pyrene	UG/L	---	---	---	< 0.5 U	---	---	---	< 0.5 U
Isophorone	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
Naphthalene	UG/L	---	---	---	< 0.5 U	---	---	---	< 0.5 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER E

Property Owner		PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E
Location Description		WELL IS LOCATED NORTH OF BARN.		WELL IS LOCATED NORTH OF BARN.	WELL IS LOCATED NORTH OF BARN.	WELL IS LOCATED NORTH OF BARN.		WELL IS LOCATED IN BUSHES IN FRONT OF HOUSE.	WELL IS LOCATED IN BUSHES IN FRONT OF HOUSE.
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		115	115	115	115	185	185	185	185
Sampled Before Treatment?		NA	NA	NA	NA	NA	NA	Pre-Treatment	Pre-Treatment
Sample ID		NTD0308-04012010-1625	NTH1162-PROPERTY OWNER E 002	0108201150103	1104201120206	NTD0293-04012010-1545	NTH1160-PROPERTY OWNER E 001	0108201150101	1104201120204
Parameter and units	Sample Date	4/1/2010 (Baseline)	8/12/2010	1/8/2011	11/4/2011	4/1/2010 (Baseline)	8/12/2010	1/8/2011	11/4/2011
Nitrobenzene	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
N-Nitrosodiethylamine	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
N-Nitrosodimethylamine	UG/L	---	---	---	< 5 U	---	---	---	< 5 U
N-Nitrosodi-n-butylamine	UG/L	---	---	---	< 5 U	---	---	---	< 5 U
N-Nitrosodi-n-propylamine	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
N-Nitrosodiphenylamine	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
N-Nitrosomethylethylamine	UG/L	---	---	---	< 5 U	---	---	---	< 5 U
Parathion-ethyl	UG/L	---	---	---	< 5 U	---	---	---	< 5 U
Parathion-methyl	UG/L	---	---	---	< 5 U	---	---	---	< 5 U
Pentachlorobenzene	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
Pentachlorophenol	UG/L	---	---	---	< 5 U	---	---	---	< 5 U
Phenanthrene	UG/L	---	---	---	< 0.5 U	---	---	---	< 0.5 U
Phenol	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
Phorate	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
Pronamide	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
Pyrene	UG/L	---	---	---	< 0.5 U	---	---	---	< 0.5 U
Pyridine	UG/L	---	---	---	< 5 U	---	---	---	< 5 U
Squalene	UG/L	---	---	---	< 5 UJ	---	---	---	< 5 UJ
Terbufos	UG/L	---	---	---	< 5 UJ	---	---	---	< 5 UJ
Terpineol	UG/L	---	---	---	< 5 U	---	---	---	< 5 U
Tributoxyethyl phosphate	UG/L	---	---	---	< 5 U	---	---	---	< 5 U
Trifluralin	UG/L	---	---	---	< 5 UJ	---	---	---	< 5 UJ
TICs									
1,2,3-Trimethylbenzene	UG/L	---	---	---	---	---	---	---	---
Volatile Organics									
1,1,1-Trichloroethane	UG/L	---	---	---	< 1.00 U	---	---	---	< 1.00 U
1,1,2-Trichloroethane	UG/L	---	---	---	< 1.00 U	---	---	---	< 1.00 U
1,1-Dichloroethane	UG/L	---	---	---	< 1.00 U	---	---	---	< 1.00 U
1,1-Dichloroethene	UG/L	---	---	---	< 1.00 U	---	---	---	< 1.00 U
1,2,3-Trimethylbenzene	UG/L	---	---	---	< 1.00 U	---	---	---	< 1.00 U
1,2,4-Trichlorobenzene	UG/L	---	---	---	---	---	---	---	---
1,2,4-Trimethylbenzene	UG/L	---	---	---	< 1.00 U	---	---	---	< 1.00 U
1,2-Dibromo-3-chloropropane	UG/L	---	---	---	< 0.1012 U	---	---	---	< 0.1003 U
1,2-Dichlorobenzene	UG/L	---	---	---	< 1.00 U	---	---	---	< 1.00 U
1,2-Dichloroethane	UG/L	---	---	---	< 1.00 U	---	---	---	< 1.00 U
1,2-Dichloropropane	UG/L	---	---	---	---	---	---	---	---
1,3,5-Trimethylbenzene	UG/L	---	---	---	< 1.00 U	---	---	---	< 1.00 U
1,3-Dichlorobenzene	UG/L	---	---	---	< 1.00 U	---	---	---	< 1.00 U
1,4-Dichlorobenzene	UG/L	---	---	---	< 1.00 U	---	---	---	< 1.00 U
Acetone	UG/L	---	---	---	< 50.0 U	---	---	---	< 50.0 U
Benzene	UG/L	< 0.500 U	ND	< 0.5 U	< 1.00 U	< 0.500 U	ND	< 0.5 U	< 1.00 U
Carbon disulfide	UG/L	---	---	---	< 1.00 U	---	---	---	< 1.00 U
Carbon Tetrachloride	UG/L	---	---	---	< 1.00 U	---	---	---	< 1.00 U
Chlorobenzene	UG/L	---	---	---	< 1.00 U	---	---	---	< 1.00 U
Chloroform	UG/L	---	---	---	< 1.00 U	---	---	---	< 1.00 U
cis-1,2-Dichloroethene	UG/L	---	---	---	< 1.00 U	---	---	---	< 1.00 U
Diisopropyl Ether	UG/L	---	---	---	< 1.00 U	---	---	---	< 1.00 U
Ethanol	UG/L	---	---	---	< 100 U	---	---	---	< 100 U
Ethyl tert-Butyl Ether	UG/L	---	---	---	< 1.00 U	---	---	---	< 1.00 U
Ethylbenzene	UG/L	< 0.500 U	ND	< 0.5 UJH	< 1.00 U	< 0.500 U	ND	< 0.5 U	< 1.00 U
Hexachlorobutadiene	UG/L	---	---	---	< 1 U	---	---	---	< 0.9 U
Isopropyl alcohol	UG/L	---	---	---	< 50.0 U	---	---	---	< 50.0 U
Isopropylbenzene	UG/L	---	---	---	< 1.00 U	---	---	---	< 1.00 U
m,p-Xylene	UG/L	---	---	---	< 2.00 U	---	---	---	< 2.00 U
Methoxychlor	UG/L	---	---	---	< 0.0236 U	---	---	---	< 0.0236 U
Methyl tert-Butyl Ether	UG/L	---	---	---	< 1.00 U	---	---	---	< 1.00 U
Methylene Chloride	UG/L	---	---	---	< 5.00 U	---	---	---	< 5.00 U
Naphthalene	UG/L	---	---	---	< 5.00 U	---	---	---	< 5.00 U
o-Xylene	UG/L	---	---	---	< 1.00 U	---	---	---	< 1.00 U
Styrene	UG/L	---	---	---	---	---	---	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER E

Property Owner		PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E	PROPERTY OWNER E
Location Description		WELL IS LOCATED NORTH OF BARN.		WELL IS LOCATED NORTH OF BARN.	WELL IS LOCATED NORTH OF BARN.	WELL IS LOCATED NORTH OF BARN.		WELL IS LOCATED IN BUSHES IN FRONT OF HOUSE.	WELL IS LOCATED IN BUSHES IN FRONT OF HOUSE.
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		115	115	115	115	185	185	185	185
Sampled Before Treatment?		NA	NA	NA	NA	NA	NA	Pre-Treatment	Pre-Treatment
Sample ID		NTD0308-04012010-1625	NTH1162-PROPERTY OWNER E 002	0108201150103	1104201120206	NTD0293-04012010-1545	NTH1160-PROPERTY OWNER E 001	0108201150101	1104201120204
Parameter and units	Sample Date	4/1/2010 (Baseline)	8/12/2010	1/8/2011	11/4/2011	4/1/2010 (Baseline)	8/12/2010	1/8/2011	11/4/2011
Tert-Amyl Methyl Ether	UG/L	---	---	---	< 1.00 U	---	---	---	< 1.00 U
Tertiary Butyl Alcohol	UG/L	---	---	---	< 10.0 U	---	---	---	< 10.0 U
Tetrachloroethene	UG/L	---	---	---	< 1.00 U	---	---	---	< 1.00 U
Tetrahydrofuran	UG/L	---	---	---	---	---	---	---	---
Toluene	UG/L	< 0.500 U	ND	< 0.5 U	< 1.00 U	< 0.500 U	ND	< 0.5 U	< 1.00 U
trans-1,2-Dichloroethene	UG/L	---	---	---	< 1.00 U	---	---	---	< 1.00 U
Trichloroethene	UG/L	---	---	---	< 1.00 U	---	---	---	< 1.00 U
Vinyl chloride	UG/L	---	---	---	< 1.00 U	---	---	---	< 1.00 U
Xylenes, total	UG/L	< 0.500 U	ND	< 0.5 U	< 3.00 U	< 0.500 U	ND	< 0.5 U	< 3.00 U

Notes:

U : Parameter not detected at posted limit
< : Parameter not detected at posted limit
ND : Parameter not detected
H : Parameter analyzed beyond method recommended holding time
J : Estimated value
--- : Parameter not analyzed.
B : Blank qualified
ug/L : Micrograms per liter
mg/L : Milligrams per liter
NA : Not Available
NTU : Nephelometric Turbidity Unit
umho/cm : Micromhos per centimeter
colonies/100 ml : Colonies per 100 millileters

APPENDIX A-6
EPA STUDY WELL DATA
PROPERTY OWNER F

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER F

Property Owner		PROPERTY OWNER F	PROPERTY OWNER F	PROPERTY OWNER F
Location Description		WELL LOCATED NORTH OF HOUSE. PADEP ON SITE TO COLLECT SAMPLE.	WELL LOCATED NORTH OF HOUSE. PADEP ON SITE TO COLLECT SAMPLE.	WELL LOCATED NORTH OF HOUSE. PADEP ON SITE TO COLLECT SAMPLE.
Source Type		WELL	WELL	WELL
Well Depth		200	200	200
Sampled Before Treatment?		NA	NA	NA
Sample ID		0310201150104	1025201120201	1111201124301
Parameter and units	Sample Date	3/10/2011	10/25/2011	11/11/2011
Aldehydes				
Gluteraldehyde	UG/L	---	---	---
Bacteria				
E. coli	colonies/100ml	---	Absent	---
Fecal coliform bacteria	colonies/100ml	---	< 1 U	---
Total Coliform Bacteria	colonies/100ml	---	Absent	---
DBCP				
1,2-Dibromo-3-chloropropane	UG/L	---	< 0.1036 U	---
Extractable Petroleum Hydrocarbons				
Diesel	UG/L	---	< 94.3 U	---
General Chemistry				
Alkalinity, Total (CaCO3)	MG/L	---	231	---
Ammonia as N	MG/L	---	0.981	---
Bicarbonate Alkalinity as CaCO3	MG/L	221	231	220
Bromide	MG/L	---	< 2.5 U	< 5.00 U
Carbonate as CaCO3	MG/L	11.3	< 10.0 U	25.2
Chloride	MG/L	45	56.0 J	44
CO2 by Headspace	UG/L	---	< 12000 U	---
Cyanide	MG/L	---	---	---
Fluoride	MG/L	---	< 0.50 U	---
MBAS	MG/L	< 0.05 U	< 0.12 U	< 0.0500 U
Nitrate	MG/L	---	---	---
Nitrate Nitrogen	MG/L	---	< 0.50 U	---
Nitrite Nitrogen	MG/L	---	< 0.50 U	---
Oil & Grease HEM	MG/L	< 6.02 U	< 4.71 U	< 6.10 U
pH	pH UNITS	8.3 J	7.90 H	8.30 H
Phosphorus	MG/L	---	< 0.100 U	---
Specific conductance	UMHO/CM	600	641	609
Sulfate	MG/L	< 5 U	< 5.0 UJ	< 5.00 U
Temperature of pH determination	CELSIUS	21.2	21.5 H	21.4 H
Total Dissolved Solids	MG/L	346	348	340
Total Suspended Solids	MG/L	< 1 U	< 1.00 U	< 1.00 U
Turbidity	NTU	1.3	0.54	< 1.00 U
Glycols				
1,2-Propylene Glycol	MG/L	---	---	---
Diethylene Glycol	MG/L	---	< 10 U	---
Ethylene Glycol	MG/L	---	---	---
Tetraethylene glycol	MG/L	---	11 J	---
Triethylene glycol	MG/L	---	< 10 U	---
Light Gases				
Acetylene	MG/L	---	< 0.00500 U	---
Ethane	MG/L	< 0.026 U	0.0202	0.202
Ethene	MG/L	---	< 0.00500 U	---
Methane	MG/L	53.4	55.3	51.8
n-Butane	MG/L	---	< 0.00500 U	---
Propane	MG/L	< 0.034 U	< 0.00500 U	< 0.00500 U
Low Molecular Weight Acids				
Acetic Acid	UG/L	---	< 10000 U	---
Butyric Acid	UG/L	---	< 10000 U	---
Formic Acid	UG/L	---	< 10000 U	---
Isobutyric acid	UG/L	---	< 10000 U	---
Lactic acid	UG/L	---	< 5000 U	---
Propionic Acid	UG/L	---	< 13000 U	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER F

Property Owner		PROPERTY OWNER F	PROPERTY OWNER F	PROPERTY OWNER F
Location Description		WELL LOCATED NORTH OF HOUSE. PADEP ON SITE TO COLLECT SAMPLE.	WELL LOCATED NORTH OF HOUSE. PADEP ON SITE TO COLLECT SAMPLE.	WELL LOCATED NORTH OF HOUSE. PADEP ON SITE TO COLLECT SAMPLE.
Source Type		WELL	WELL	WELL
Well Depth		200	200	200
Sampled Before Treatment?		NA	NA	NA
Sample ID		0310201150104	1025201120201	1111201124301
Parameter and units	Sample Date	3/10/2011	10/25/2011	11/11/2011
Metals, 6020x				
Cesium	MG/L	---	0.00074	---
Cesium, Dissolved	MG/L	---	0.0007	---
Potassium	MG/L	---	1.88	---
Potassium, Dissolved	MG/L	---	1.85	---
Silicon	MG/L	---	4	---
Silicon, Dissolved	MG/L	---	0.404	---
Thorium	MG/L	---	< 0.002 U	---
Thorium, Dissolved	MG/L	---	< 0.002 U	---
Uranium	MG/L	---	< 0.001 U	---
Uranium, Dissolved	MG/L	---	< 0.001 U	---
Metals, Total				
Aluminum	MG/L	---	< 0.0200 U	---
Antimony	MG/L	---	< 0.00200 U	---
Arsenic	MG/L	< 0.01 U	< 0.00200 U	< 0.0100 U
Barium	MG/L	0.944	0.937	0.924
Beryllium	MG/L	---	< 0.00200 U	---
Boron	MG/L	---	0.551	---
Cadmium	MG/L	< 0.001 U	< 0.00100 U	< 0.00100 U
Calcium	MG/L	12.5	12.8	12.7
Chromium	MG/L	< 0.005 U	< 0.00200 U	< 0.00500 U
Cobalt	MG/L	---	< 0.00200 U	---
Copper	MG/L	---	0.0482	---
Hardness, CaCO3	MG/L	---	---	---
Iron	MG/L	0.0542	0.113	0.0707
Lead	MG/L	< 0.005 U	< 0.00200 U	< 0.00500 U
Lithium	MG/L	---	---	0.1
Magnesium	MG/L	1.98	2.05	2.23
Manganese	MG/L	< 0.015 U	0.00749	< 0.0150 U
Mercury	MG/L	< 0.0002 U	< 0.000200 U	< 0.000200 U
Molybdenum	MG/L	---	< 0.00500 U	---
Nickel	MG/L	---	< 0.00500 U	---
Potassium	MG/L	1.93	1.83	1.87
Selenium	MG/L	< 0.01 U	< 0.00200 U	< 0.0100 U
Silver	MG/L	< 0.005 U	< 0.00200 U	< 0.00500 U
Sodium	MG/L	122	122 J	118
Strontium	MG/L	---	1.74	1.76
Sulfur	MG/L	< 0.5 U	< 0.500 U	< 0.500 U
Thallium	MG/L	---	< 0.00200 U	---
Titanium	MG/L	---	< 0.00200 U	---
Vanadium	MG/L	---	< 0.00400 U	---
Zinc	MG/L	---	< 0.0500 U	---
Metals, Dissolved				
Aluminum, Dissolved	MG/L	---	< 0.0200 U	---
Antimony, Dissolved	MG/L	---	< 0.00200 U	---
Arsenic, Dissolved	MG/L	---	< 0.00200 U	---
Barium, Dissolved	MG/L	---	0.843	---
Beryllium, Dissolved	MG/L	---	< 0.00200 U	---
Boron, Dissolved	MG/L	---	0.578	---
Cadmium, Dissolved	MG/L	---	< 0.00100 U	---
Calcium, Dissolved	MG/L	---	12.8	---
Chromium, Dissolved	MG/L	---	< 0.00200 U	---
Cobalt, Dissolved	MG/L	---	< 0.00200 U	---
Copper, Dissolved	MG/L	---	< 0.00500 U	---
Iron, Dissolved	MG/L	---	0.0715	---
Lead, Dissolved	MG/L	---	< 0.00200 U	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER F

Property Owner		PROPERTY OWNER F	PROPERTY OWNER F	PROPERTY OWNER F
Location Description		WELL LOCATED NORTH OF HOUSE. PADEP ON SITE TO COLLECT SAMPLE.	WELL LOCATED NORTH OF HOUSE. PADEP ON SITE TO COLLECT SAMPLE.	WELL LOCATED NORTH OF HOUSE. PADEP ON SITE TO COLLECT SAMPLE.
Source Type		WELL	WELL	WELL
Well Depth		200	200	200
Sampled Before Treatment?		NA	NA	NA
Sample ID		0310201150104	1025201120201	1111201124301
Parameter and units	Sample Date	3/10/2011	10/25/2011	11/11/2011
Magnesium, Dissolved	MG/L	---	2.15	---
Manganese, Dissolved	MG/L	---	0.00698	---
Mercury, Dissolved	MG/L	---	< 0.000200 U	---
Molybdenum, Dissolved	MG/L	---	< 0.00500 U	---
Nickel, Dissolved	MG/L	---	< 0.00500 U	---
Potassium, Dissolved	MG/L	---	1.75	---
Selenium, Dissolved	MG/L	---	< 0.00200 U	---
Silver, Dissolved	MG/L	---	< 0.00200 U	---
Sodium, Dissolved	MG/L	---	118	---
Strontium, Dissolved	MG/L	---	1.75	---
Sulfur, Dissolved	MG/L	---	< 0.500 U	---
Thallium, Dissolved	MG/L	---	< 0.00200 U	---
Titanium, Dissolved	MG/L	---	< 0.00200 U	---
Vanadium, Dissolved	MG/L	---	< 0.00400 U	---
Zinc, Dissolved	MG/L	---	< 0.0500 U	---
Miscellaneous Organics				
Inorganic Carbon, Dissolved	MG/L	---	63.2	---
Organic Carbon, Dissolved	MG/L	---	< 1.00 U	---
Pesticides and PCBs				
4,4'-DDD	UG/L	---	< 0.0472 U	---
4,4'-DDE	UG/L	---	< 0.0472 U	---
4,4'-DDT	UG/L	---	< 0.0472 U	---
Aldrin	UG/L	---	< 0.0472 U	---
alpha-BHC	UG/L	---	< 0.0472 U	---
Azinphos-methyl	UG/L	---	< 0.94 UH	---
beta-BHC	UG/L	---	< 0.0472 U	---
Carbaryl	UG/L	---	< 6.0 U	---
delta-BHC	UG/L	---	< 0.0472 U	---
Dichlorvos	UG/L	---	< 0.94 UH	---
Dieldrin	UG/L	---	< 0.0472 U	---
Disulfoton	UG/L	---	< 0.94 UH	---
Endosulfan I	UG/L	---	< 0.0472 U	---
Endosulfan II	UG/L	---	< 0.0472 U	---
Endosulfan sulfate	UG/L	---	< 0.0472 U	---
Endrin	UG/L	---	< 0.0472 U	---
Endrin aldehyde	UG/L	---	< 0.0472 U	---
Endrin ketone	UG/L	---	< 0.0472 U	---
gamma-BHC (Lindane)	UG/L	---	< 0.0472 U	---
Heptachlor	UG/L	---	< 0.0472 U	---
Heptachlor epoxide	UG/L	---	< 0.0472 U	---
Malathion	UG/L	---	< 0.94 UH	---
Methoxychlor	UG/L	---	< 0.0472 U	---
Mevinphos	UG/L	---	< 0.94 UH	---
Purgeable Petroleum Hydrocarbons				
GRO as Gasoline	UG/L	---	< 100 U	---
Semivolatile Organics				
1,2,4,5-Tetrachlorobenzene	UG/L	---	< 1 U	---
1,2-Dinitrobenzene	UG/L	---	< 5 U	---
1,2-Diphenylhydrazine	UG/L	---	< 1 U	---
1,3-Dimethyl adamatane	UG/L	---	< 5 U	---
1,3-Dinitrobenzene	UG/L	---	< 5 U	---
1,4-Dinitrobenzene	UG/L	---	< 5 U	---
1-Chloronaphthalene	UG/L	---	< 1 U	---
2,3,4,6-Tetrachlorophenol	UG/L	---	< 1 U	---
2,4,5-Trichlorophenol	UG/L	---	< 1 U	---
2,4,6-Trichlorophenol	UG/L	---	< 1 U	---
2,4-Dichlorophenol	UG/L	---	< 1 U	---
2,4-Dimethylphenol	UG/L	---	< 1 U	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER F

Property Owner		PROPERTY OWNER F	PROPERTY OWNER F	PROPERTY OWNER F
Location Description		WELL LOCATED NORTH OF HOUSE. PADEP ON SITE TO COLLECT SAMPLE.	WELL LOCATED NORTH OF HOUSE. PADEP ON SITE TO COLLECT SAMPLE.	WELL LOCATED NORTH OF HOUSE. PADEP ON SITE TO COLLECT SAMPLE.
Source Type		WELL	WELL	WELL
Well Depth		200	200	200
Sampled Before Treatment?		NA	NA	NA
Sample ID		0310201150104	1025201120201	1111201124301
Parameter and units	Sample Date	3/10/2011	10/25/2011	11/11/2011
2,4-Dinitrophenol	UG/L	---	< 29 U	---
2,4-Dinitrotoluene	UG/L	---	< 5 U	---
2,6-Dichlorophenol	UG/L	---	< 1 U	---
2,6-Dinitrotoluene	UG/L	---	< 1 U	---
2-Butoxyethanol	UG/L	---	< 5 U	---
2-Chloronaphthalene	UG/L	---	< 1 U	---
2-Chlorophenol	UG/L	---	< 1 U	---
2-Methylnaphthalene	UG/L	---	< 0.5 U	---
2-Methylphenol	UG/L	---	< 1 U	---
2-Nitroaniline	UG/L	---	< 1 U	---
2-Nitrophenol	UG/L	---	< 1 U	---
3,3-Dichlorobenzidine	UG/L	---	< 5 U	---
3-Nitroaniline	UG/L	---	< 1 U	---
4,4'-Methylenebis(2-chloroaniline)	UG/L	---	< 14 UJ	---
4,4'-Methylenebis(N,N-dimethylanilin	UG/L	---	< 14 U	---
4,6-Dinitro-2-methylphenol	UG/L	---	< 14 U	---
4-Bromophenyl phenyl ether	UG/L	---	< 1 U	---
4-Chloro-3-methylphenol	UG/L	---	< 1 U	---
4-Chloroaniline	UG/L	---	< 1 U	---
4-Chlorophenyl phenyl ether	UG/L	---	< 1 U	---
4-Methylphenol	UG/L	---	< 1 U	---
4-Nitroaniline	UG/L	---	< 1 U	---
4-Nitrophenol	UG/L	---	< 29 U	---
Acenaphthene	UG/L	---	< 0.5 U	---
Acenaphthylene	UG/L	---	< 0.5 U	---
Acetophenone	UG/L	---	< 1 U	---
Adamantane	UG/L	---	< 5 U	---
Aniline	UG/L	---	< 1 U	---
Anthracene	UG/L	---	< 0.5 U	---
Benzo (a) anthracene	UG/L	---	< 0.5 U	---
Benzo (a) pyrene	UG/L	---	< 0.5 U	---
Benzo (b) fluoranthene	UG/L	---	< 0.5 U	---
Benzo (g,h,i) perylene	UG/L	---	< 0.5 U	---
Benzo (k) fluoranthene	UG/L	---	< 0.5 U	---
Benzoic acid	UG/L	---	< 14 U	---
Benzyl alcohol	UG/L	---	< 14 U	---
Bis(2-chloroethoxy)methane	UG/L	---	< 1 U	---
Bis(2-chloroethyl)ether	UG/L	---	< 1 U	---
bis(2-Chloroisopropyl)ether	UG/L	---	< 1 U	---
Bis(2-ethylhexyl)phthalate	UG/L	---	< 5 U	---
Butyl benzyl phthalate	UG/L	---	< 5 U	---
Carbazole	UG/L	---	< 1 U	---
Chlorobenzilate	UG/L	---	< 10 U	---
Chrysene	UG/L	---	< 0.5 U	---
Diallate (cis or trans)	UG/L	---	< 5 U	---
Dibenz (a,h) anthracene	UG/L	---	< 0.5 U	---
Dibenzofuran	UG/L	---	< 1 U	---
Diethyl phthalate	UG/L	---	< 5 U	---
Dimethyl phthalate	UG/L	---	< 5 U	---
Di-n-butyl phthalate	UG/L	---	< 5 U	---
Di-n-octyl phthalate	UG/L	---	< 5 U	---
Dinoseb	UG/L	---	< 5 U	---
Disulfoton	UG/L	---	< 48 U	---
d-Limonene	UG/L	---	< 5 U	---
Fluoranthene	UG/L	---	< 0.5 U	---
Fluorene	UG/L	---	< 0.5 U	---
Hexachlorobenzene	UG/L	---	< 0.5 U	---
Hexachlorobutadiene	UG/L	---	< 1 U	---
Hexachlorocyclopentadiene	UG/L	---	< 14 U	---
Hexachloroethane	UG/L	---	< 5 U	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER F

Property Owner		PROPERTY OWNER F	PROPERTY OWNER F	PROPERTY OWNER F
Location Description		WELL LOCATED NORTH OF HOUSE. PADEP ON SITE TO COLLECT SAMPLE.	WELL LOCATED NORTH OF HOUSE. PADEP ON SITE TO COLLECT SAMPLE.	WELL LOCATED NORTH OF HOUSE. PADEP ON SITE TO COLLECT SAMPLE.
Source Type		WELL	WELL	WELL
Well Depth		200	200	200
Sampled Before Treatment?		NA	NA	NA
Sample ID		0310201150104	1025201120201	1111201124301
Parameter and units	Sample Date	3/10/2011	10/25/2011	11/11/2011
Indeno (1,2,3-cd) pyrene	UG/L	---	< 0.5 U	---
Isophorone	UG/L	---	< 1 U	---
Naphthalene	UG/L	---	< 0.5 U	---
Nitrobenzene	UG/L	---	< 1 U	---
N-Nitrosodiethylamine	UG/L	---	< 1 U	---
N-Nitrosodimethylamine	UG/L	---	< 5 U	---
N-Nitrosodi-n-butylamine	UG/L	---	< 5 U	---
N-Nitrosodi-n-propylamine	UG/L	---	< 1 U	---
N-Nitrosodiphenylamine	UG/L	---	< 1 U	---
N-Nitrosomethylethylamine	UG/L	---	< 5 U	---
Parathion-ethyl	UG/L	---	< 5 U	---
Parathion-methyl	UG/L	---	< 5 U	---
Pentachlorobenzene	UG/L	---	< 1 U	---
Pentachlorophenol	UG/L	---	< 5 U	---
Phenanthrene	UG/L	---	< 0.5 U	---
Phenol	UG/L	---	< 1 U	---
Phorate	UG/L	---	< 1 U	---
Pronamide	UG/L	---	< 1 U	---
Pyrene	UG/L	---	< 0.5 U	---
Pyridine	UG/L	---	< 5 U	---
Squalene	UG/L	---	< 5 U	---
Terbufos	UG/L	---	< 5 U	---
Terpineol	UG/L	---	< 5 U	---
Tributoxyethyl phosphate	UG/L	---	< 5 U	---
Trifluralin	UG/L	---	< 5 U	---
TICs				
1,2,3-Trimethylbenzene	UG/L	---	< 100 U	---
Volatile Organics				
1,1,1-Trichloroethane	UG/L	---	< 1.00 U	---
1,1,2-Trichloroethane	UG/L	---	< 1.00 U	---
1,1-Dichloroethane	UG/L	---	< 1.00 U	---
1,1-Dichloroethene	UG/L	---	< 1.00 U	---
1,2,3-Trimethylbenzene	UG/L	---	< 1.00 U	---
1,2,4-Trichlorobenzene	UG/L	---	---	---
1,2,4-Trimethylbenzene	UG/L	---	< 1.00 U	---
1,2-Dibromo-3-chloropropane	UG/L	---	< 0.1036 U	---
1,2-Dichlorobenzene	UG/L	---	< 1.00 U	---
1,2-Dichloroethane	UG/L	---	< 1.00 U	---
1,2-Dichloropropane	UG/L	---	---	---
1,3,5-Trimethylbenzene	UG/L	---	< 1.00 U	---
1,3-Dichlorobenzene	UG/L	---	< 1.00 U	---
1,4-Dichlorobenzene	UG/L	---	< 1.00 U	---
Acetone	UG/L	---	< 50.0 U	---
Benzene	UG/L	< 0.5 U	< 1.00 U	< 0.500 U
Carbon disulfide	UG/L	---	< 1.00 U	---
Carbon Tetrachloride	UG/L	---	< 1.00 U	---
Chlorobenzene	UG/L	---	< 1.00 U	---
Chloroform	UG/L	---	< 1.00 U	---
cis-1,2-Dichloroethene	UG/L	---	< 1.00 U	---
Diisopropyl Ether	UG/L	---	< 1.00 U	---
Ethanol	UG/L	---	< 100 U	---
Ethyl tert-Butyl Ether	UG/L	---	< 1.00 U	---
Ethylbenzene	UG/L	< 0.5 U	< 1.00 U	< 0.500 U
Hexachlorobutadiene	UG/L	---	< 1 U	---
Isopropyl alcohol	UG/L	---	< 50.0 U	---
Isopropylbenzene	UG/L	---	< 1.00 U	---
m,p-Xylene	UG/L	---	< 2.00 U	---
Methoxychlor	UG/L	---	< 0.0472 U	---
Methyl tert-Butyl Ether	UG/L	---	< 1.00 U	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER F

Property Owner		PROPERTY OWNER F	PROPERTY OWNER F	PROPERTY OWNER F
Location Description		WELL LOCATED NORTH OF HOUSE. PADEP ON SITE TO COLLECT SAMPLE.	WELL LOCATED NORTH OF HOUSE. PADEP ON SITE TO COLLECT SAMPLE.	WELL LOCATED NORTH OF HOUSE. PADEP ON SITE TO COLLECT SAMPLE.
Source Type		WELL	WELL	WELL
Well Depth		200	200	200
Sampled Before Treatment?		NA	NA	NA
Sample ID		0310201150104	1025201120201	1111201124301
Parameter and units	Sample Date	3/10/2011	10/25/2011	11/11/2011
Methylene Chloride	UG/L	---	< 5.00 U	---
Naphthalene	UG/L	---	< 5.00 U	---
o-Xylene	UG/L	---	< 1.00 U	---
Styrene	UG/L	---	---	---
Tert-Amyl Methyl Ether	UG/L	---	< 1.00 U	---
Tertiary Butyl Alcohol	UG/L	---	< 10.0 U	---
Tetrachloroethene	UG/L	---	< 1.00 U	---
Tetrahydrofuran	UG/L	---	---	---
Toluene	UG/L	< 0.5 U	< 1.00 U	< 0.500 U
trans-1,2-Dichloroethene	UG/L	---	< 1.00 U	---
Trichloroethene	UG/L	---	< 1.00 U	---
Vinyl chloride	UG/L	---	< 1.00 U	---
Xylenes, total	UG/L	< 0.5 U	< 3.00 U	< 0.500 U

Notes:
U : Parameter not detected at posted limit
< : Parameter not detected at posted limit
ND : Parameter not detected
H : Parameter analyzed beyond method recommended holding time
J : Estimated value
--- : Parameter not analyzed.
B : Blank qualified
ug/L : Micrograms per liter
mg/L : Milligrams per liter
NA : Not Available
NTU : Nephelometric Turbidity Unit
umho/cm : Micromhos per centimeter
colonies/100 ml : Colonies per 100 millileters

APPENDIX A-7
EPA STUDY WELL DATA
PROPERTY OWNER G

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER G

Property Owner		PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G
Location Description		THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN
Sampled Before Treatment?		NA	NA	NA	NA	NA	Pre-Treatment	Post-Treatment	Pre-Treatment
Sample ID		NTD0310-04022010-0840	1001201021403	1110201020203	0628201122901	0901201120204	1013201120201	1013201120202	1027201120204
Parameter and units	Sample Date	4/2/2010 (Baseline)	10/1/2010	11/10/2010	6/28/2011	9/1/2011	10/13/2011	10/13/2011	10/27/2011
Aldehydes									
Gluteraldehyde	UG/L	---	---	---	---	---	---	---	---
Bacteria									
E. coli	colonies/100ml	---	---	---	---	---	---	---	Present
Fecal coliform bacteria	colonies/100ml	---	---	---	---	---	---	---	2
Total Coliform Bacteria	colonies/100ml	---	---	---	---	---	---	---	Present
DBCP									
1,2-Dibromo-3-chloropropane	UG/L	---	---	---	---	---	---	---	< 0.1014 U
Extractable Petroleum Hydrocarbons									
Diesel	UG/L	---	---	---	---	---	---	---	< 94.3 U
General Chemistry									
Alkalinity, Total (CaCO3)	MG/L	---	---	---	---	---	---	---	43.6
Ammonia as N	MG/L	---	---	---	---	---	---	---	< 0.100 U
Bicarbonate Alkalinity as CaCO3	MG/L	47.8	39.5	43.6 HJ	48.2	58.5	54.1	57.4	42.6
Bromide	MG/L	---	---	---	---	---	---	---	< 2.5 U
Carbonate as CaCO3	MG/L	< 10.0 U	< 10.0 U	< 10.0 U	< 10.0 U	< 10.0 U	< 10.0 U	< 10.0 U	< 10.0 U
Chloride	MG/L	1.23	< 5.00 U	< 5.00 U	< 5.00 U	< 5.00 U	< 5.00 U	< 5.00 U	2.2
CO2 by Headspace	UG/L	---	---	---	---	---	---	---	25000
Cyanide	MG/L	---	---	< 0.0500 U	---	---	---	---	---
Fluoride	MG/L	---	---	---	---	---	---	---	< 0.50 U
MBAS	MG/L	0.142	< 0.0500 U	0.0611	< 0.0500 U	< 0.0500 U	< 0.0500 UH	< 0.0500 UH	< 0.12 U
Nitrate	MG/L	---	---	---	---	---	---	---	---
Nitrate Nitrogen	MG/L	---	---	---	---	---	---	---	0.84
Nitrite Nitrogen	MG/L	---	---	---	---	---	---	---	< 0.50 U
Oil & Grease HEM	MG/L	< 5.75 U	< 6.85 U	< 5.81 U	< 5.88 U	< 6.49 U	< 7.04 U	< 5.95 U	< 4.82 U
pH	pH UNITS	6.60 H	6.60 H	6.50 HJ	6.70 H	6.90 H	7.00 H	6.50 H	6.50 H
Phosphorus	MG/L	---	---	---	---	---	---	---	< 0.100 U
Specific conductance	UMHO/CM	107	107	117	142	170	149	154	127
Sulfate	MG/L	13.7	12.2	15	12.4	15.6	16.3	16.1	19.1 J
Temperature of pH determination	CELSIUS	23.1 H	21.4 H	21.9 HJ	21.0 H	24.6 H	21.6 H	21.6 H	21.0 H
Total Dissolved Solids	MG/L	77	274	88	111	96	90.9	68	68.1 J
Total Suspended Solids	MG/L	< 1.00 U	157	15.8	58	4.9	13.8	< 1.00 U	2.8
Turbidity	NTU	< 1.00 U	4.6	24	91.2	16.1	37.1 H	1.18 H	13
Glycols									
1,2-Propylene Glycol	MG/L	---	---	---	---	---	---	---	---
Diethylene Glycol	MG/L	---	---	---	---	---	---	---	< 10 U
Ethylene Glycol	MG/L	---	---	---	---	---	---	---	---
Tetraethylene glycol	MG/L	---	---	---	---	---	---	---	< 10 UJ
Triethylene glycol	MG/L	---	---	---	---	---	---	---	< 10 U
Light Gases									
Acetylene	MG/L	---	---	---	---	---	---	---	< 0.00500 U
Ethane	MG/L	< 0.0260 U	< 0.0260 U	< 0.0260 U	< 0.0260 U	< 0.00500 U	< 0.00500 U	< 0.00500 U	< 0.00500 U
Ethene	MG/L	---	---	---	< 0.0260 U	< 0.00500 U	---	---	< 0.00500 U
Methane	MG/L	0.035	< 0.0260 U	< 0.0260 U	< 0.0260 U	0.0126	< 0.00500 U	< 0.00500 U	< 0.00500 U
n-Butane	MG/L	---	---	---	---	---	---	---	< 0.00500 U
Propane	MG/L	< 0.0340 U	< 0.0340 U	< 0.0340 U	< 0.0340 U	< 0.00500 U	< 0.00500 U	< 0.00500 U	< 0.00500 U
Low Molecular Weight Acids									
Acetic Acid	UG/L	---	---	---	---	---	---	---	< 10000 U
Butyric Acid	UG/L	---	---	---	---	---	---	---	< 10000 U
Formic Acid	UG/L	---	---	---	---	---	---	---	< 10000 U
Isobutyric acid	UG/L	---	---	---	---	---	---	---	< 10000 U
Lactic acid	UG/L	---	---	---	---	---	---	---	< 5000 U
Propionic Acid	UG/L	---	---	---	---	---	---	---	< 13000 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER G

Property Owner		PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G
Location Description		THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN
Sampled Before Treatment?		NA	NA	NA	NA	NA	Pre-Treatment	Post-Treatment	Pre-Treatment
Sample ID		NTD0310-04022010-0840	1001201021403	1110201020203	0628201122901	0901201120204	1013201120201	1013201120202	1027201120204
Parameter and units	Sample Date	4/2/2010 (Baseline)	10/1/2010	11/10/2010	6/28/2011	9/1/2011	10/13/2011	10/13/2011	10/27/2011
Metals, 6020x									
Cesium	MG/L	---	---	---	---	---	---	---	< 0.0001 U
Cesium, Dissolved	MG/L	---	---	---	---	---	---	---	< 0.0001 U
Potassium	MG/L	---	---	---	---	---	---	---	0.966
Potassium, Dissolved	MG/L	---	---	---	---	---	---	---	0.924
Silicon	MG/L	---	---	---	---	---	---	---	4.43
Silicon, Dissolved	MG/L	---	---	---	---	---	---	---	4.78
Thorium	MG/L	---	---	---	---	---	---	---	< 0.002 U
Thorium, Dissolved	MG/L	---	---	---	---	---	---	---	< 0.002 U
Uranium	MG/L	---	---	---	---	---	---	---	< 0.001 U
Uranium, Dissolved	MG/L	---	---	---	---	---	---	---	< 0.001 U
Metals, Total									
Aluminum	MG/L	---	---	---	---	---	---	---	0.0633
Antimony	MG/L	---	---	---	---	---	---	---	< 0.00200 U
Arsenic	MG/L	< 0.0100 U	< 0.0100 U	< 0.0100 U	< 0.0100 U	< 0.0100 U	< 0.0100 U	< 0.0100 U	< 0.00200 U
Barium	MG/L	0.116	0.296	0.168	0.156	0.162	0.177	0.0616	0.145
Beryllium	MG/L	---	---	---	---	---	---	---	< 0.00200 U
Boron	MG/L	---	---	---	---	---	---	---	< 0.0500 U
Cadmium	MG/L	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U
Calcium	MG/L	13.6	17.3	17.6	18.3	22.3	19.6	21.6	16.6
Chromium	MG/L	< 0.00500 U	0.0054	< 0.00500 U	< 0.00500 U	< 0.00500 U	< 0.00500 U	< 0.00500 U	< 0.00200 U
Cobalt	MG/L	---	---	---	---	---	---	---	< 0.00200 U
Copper	MG/L	---	---	---	---	---	---	---	0.00519
Hardness, CaCO3	MG/L	---	---	---	---	---	---	---	---
Iron	MG/L	0.281	10.6	3.58	2.68	3.08	4.13	0.185	0.343
Lead	MG/L	< 0.00500 U	0.005	< 0.00500 U	< 0.00500 U	< 0.00500 U	0.0061	< 0.00500 U	< 0.00200 U
Lithium	MG/L	---	---	---	---	---	---	---	---
Magnesium	MG/L	2.19	4.07	3.07	3.43	3.58	3.24	3.47	2.84
Manganese	MG/L	< 0.0150 U	0.153	0.123	0.0343	< 0.0150 U	0.0218	< 0.0150 U	< 0.00500 U
Mercury	MG/L	< 0.000200 U	< 0.000200 U	< 0.000200 U	< 0.000200 U	< 0.000200 U	< 0.000200 U	< 0.000200 U	< 0.000200 U
Molybdenum	MG/L	---	---	---	---	---	---	---	< 0.00500 U
Nickel	MG/L	---	---	---	---	---	---	---	< 0.00500 U
Potassium	MG/L	< 1.00 U	2.16	1.33	1.84	< 1.00 U	< 1.00 U	1.06	< 1.00 U
Selenium	MG/L	< 0.0100 U	< 0.0100 U	< 0.0100 U	< 0.0100 U	< 0.0100 U	< 0.0100 U	< 0.0100 U	< 0.00200 U
Silver	MG/L	< 0.00500 U	< 0.00500 U	< 0.00500 U	< 0.00500 U	< 0.00500 U	< 0.00500 U	< 0.00500 U	< 0.00200 U
Sodium	MG/L	1.71	2.14	2.55	3.87	3.49	3.13	3.52	2.38
Strontium	MG/L	---	---	---	0.0933	0.126	0.121	0.137	0.0883
Sulfur	MG/L	< 5.000 U	3.7	4.7	1740	4.3	4.23	4.44	3.96
Thallium	MG/L	---	---	---	---	---	---	---	< 0.00200 U
Titanium	MG/L	---	---	---	---	---	---	---	< 0.00200 U
Vanadium	MG/L	---	---	---	---	---	---	---	< 0.00400 U
Zinc	MG/L	---	---	---	---	---	---	---	< 0.0500 U
Metals, Dissolved									
Aluminum, Dissolved	MG/L	---	---	---	---	---	---	---	< 0.0200 U
Antimony, Dissolved	MG/L	---	---	---	---	---	---	---	< 0.00200 U
Arsenic, Dissolved	MG/L	---	---	< 0.0100 U	---	---	---	---	< 0.00200 U
Barium, Dissolved	MG/L	---	---	0.147	---	---	---	---	0.145
Beryllium, Dissolved	MG/L	---	---	---	---	---	---	---	< 0.00200 U
Boron, Dissolved	MG/L	---	---	---	---	---	---	---	< 0.0500 U
Cadmium, Dissolved	MG/L	---	---	< 0.00100 U	---	---	---	---	< 0.00100 U
Calcium, Dissolved	MG/L	---	---	17.9	---	---	---	---	16.7
Chromium, Dissolved	MG/L	---	---	< 0.00500 U	---	---	---	---	< 0.00200 U
Cobalt, Dissolved	MG/L	---	---	---	---	---	---	---	< 0.00200 U
Copper, Dissolved	MG/L	---	---	---	---	---	---	---	< 0.00500 U
Iron, Dissolved	MG/L	---	---	< 0.0500 U	---	0.109	0.0549	---	< 0.0500 U
Lead, Dissolved	MG/L	---	---	< 0.00500 U	---	---	---	---	< 0.00200 U
Magnesium, Dissolved	MG/L	---	---	3.05	---	---	---	---	2.75

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER G

Property Owner		PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G
Location Description		THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN
Sampled Before Treatment?		NA	NA	NA	NA	NA	Pre-Treatment	Post-Treatment	Pre-Treatment
Sample ID		NTD0310-04022010-0840	1001201021403	1110201020203	0628201122901	0901201120204	1013201120201	1013201120202	1027201120204
Parameter and units	Sample Date	4/2/2010 (Baseline)	10/1/2010	11/10/2010	6/28/2011	9/1/2011	10/13/2011	10/13/2011	10/27/2011
Manganese, Dissolved	MG/L	---	---	< 0.0150 U	---	0.02	< 0.0150 U	---	< 0.00500 U
Mercury, Dissolved	MG/L	---	---	< 0.000200 U	---	---	---	---	< 0.000200 U
Molybdenum, Dissolved	MG/L	---	---	---	---	---	---	---	< 0.00500 U
Nickel, Dissolved	MG/L	---	---	---	---	---	---	---	< 0.00500 U
Potassium, Dissolved	MG/L	---	---	< 1.00 U	---	---	---	---	< 1.00 U
Selenium, Dissolved	MG/L	---	---	< 0.0100 U	---	---	---	---	< 0.00200 U
Silver, Dissolved	MG/L	---	---	< 0.00500 U	---	---	---	---	< 0.00200 U
Sodium, Dissolved	MG/L	---	---	2.77	---	---	---	---	2.38
Strontium, Dissolved	MG/L	---	---	---	---	---	---	---	0.0897
Sulfur, Dissolved	MG/L	---	---	---	---	---	---	---	4.12
Thallium, Dissolved	MG/L	---	---	---	---	---	---	---	< 0.00200 U
Titanium, Dissolved	MG/L	---	---	---	---	---	---	---	< 0.00200 U
Vanadium, Dissolved	MG/L	---	---	---	---	---	---	---	< 0.00400 U
Zinc, Dissolved	MG/L	---	---	---	---	---	---	---	< 0.0500 U
Miscellaneous Organics									
Inorganic Carbon, Dissolved	MG/L	---	---	---	---	---	---	---	18.1
Organic Carbon, Dissolved	MG/L	---	---	---	---	---	---	---	< 1.00 U
Pesticides and PCBs									
4,4'-DDD	UG/L	---	---	---	---	---	---	---	< 0.0472 U
4,4'-DDE	UG/L	---	---	---	---	---	---	---	< 0.0472 U
4,4'-DDT	UG/L	---	---	---	---	---	---	---	< 0.0472 U
Aldrin	UG/L	---	---	---	---	---	---	---	< 0.0472 U
alpha-BHC	UG/L	---	---	---	---	---	---	---	< 0.0472 U
Azinphos-methyl	UG/L	---	---	---	---	---	---	---	< 0.94 U
beta-BHC	UG/L	---	---	---	---	---	---	---	< 0.0472 U
Carbaryl	UG/L	---	---	---	---	---	---	---	< 6.0 U
delta-BHC	UG/L	---	---	---	---	---	---	---	< 0.0472 U
Dichlorvos	UG/L	---	---	---	---	---	---	---	< 0.94 U
Dieldrin	UG/L	---	---	---	---	---	---	---	< 0.0472 U
Disulfoton	UG/L	---	---	---	---	---	---	---	< 0.94 U
Endosulfan I	UG/L	---	---	---	---	---	---	---	< 0.0472 U
Endosulfan II	UG/L	---	---	---	---	---	---	---	< 0.0472 U
Endosulfan sulfate	UG/L	---	---	---	---	---	---	---	< 0.0472 U
Endrin	UG/L	---	---	---	---	---	---	---	< 0.0472 U
Endrin aldehyde	UG/L	---	---	---	---	---	---	---	< 0.0472 U
Endrin ketone	UG/L	---	---	---	---	---	---	---	< 0.0472 U
gamma-BHC (Lindane)	UG/L	---	---	---	---	---	---	---	< 0.0472 U
Heptachlor	UG/L	---	---	---	---	---	---	---	< 0.0472 U
Heptachlor epoxide	UG/L	---	---	---	---	---	---	---	< 0.0472 U
Malathion	UG/L	---	---	---	---	---	---	---	< 0.94 U
Methoxychlor	UG/L	---	---	---	---	---	---	---	< 0.0472 U
Mevinphos	UG/L	---	---	---	---	---	---	---	< 0.94 U
Purgeable Petroleum Hydrocarbons									
GRO as Gasoline	UG/L	---	---	---	---	---	---	---	< 100 U
Semivolatile Organics									
1,2,4,5-Tetrachlorobenzene	UG/L	---	---	---	---	---	---	---	< 1 U
1,2-Dinitrobenzene	UG/L	---	---	---	---	---	---	---	< 5 U
1,2-Diphenylhydrazine	UG/L	---	---	---	---	---	---	---	< 1 U
1,3-Dimethyl adamatane	UG/L	---	---	---	---	---	---	---	< 5 U
1,3-Dinitrobenzene	UG/L	---	---	---	---	---	---	---	< 5 U
1,4-Dinitrobenzene	UG/L	---	---	---	---	---	---	---	< 5 U
1-Chloronaphthalene	UG/L	---	---	---	---	---	---	---	< 1 U
2,3,4,6-Tetrachlorophenol	UG/L	---	---	---	---	---	---	---	< 1 U
2,4,5-Trichlorophenol	UG/L	---	---	---	---	---	---	---	< 1 U
2,4,6-Trichlorophenol	UG/L	---	---	---	---	---	---	---	< 1 U
2,4-Dichlorophenol	UG/L	---	---	---	---	---	---	---	< 1 U
2,4-Dimethylphenol	UG/L	---	---	---	---	---	---	---	< 1 U
2,4-Dinitrophenol	UG/L	---	---	---	---	---	---	---	< 29 U
2,4-Dinitrotoluene	UG/L	---	---	---	---	---	---	---	< 5 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER G

Property Owner		PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G
Location Description		THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN
Sampled Before Treatment?		NA	NA	NA	NA	NA	Pre-Treatment	Post-Treatment	Pre-Treatment
Sample ID		NTD0310-04022010-0840	1001201021403	1110201020203	0628201122901	0901201120204	1013201120201	1013201120202	1027201120204
Parameter and units	Sample Date	4/2/2010 (Baseline)	10/1/2010	11/10/2010	6/28/2011	9/1/2011	10/13/2011	10/13/2011	10/27/2011
2,6-Dichlorophenol	UG/L	---	---	---	---	---	---	---	< 1 U
2,6-Dinitrotoluene	UG/L	---	---	---	---	---	---	---	< 1 U
2-Butoxyethanol	UG/L	---	---	---	---	---	---	---	< 5 U
2-Chloronaphthalene	UG/L	---	---	---	---	---	---	---	< 1 U
2-Chlorophenol	UG/L	---	---	---	---	---	---	---	< 1 U
2-Methylnaphthalene	UG/L	---	---	---	---	---	---	---	< 0.5 U
2-Methylphenol	UG/L	---	---	---	---	---	---	---	< 1 U
2-Nitroaniline	UG/L	---	---	---	---	---	---	---	< 1 U
2-Nitrophenol	UG/L	---	---	---	---	---	---	---	< 1 U
3,3-Dichlorobenzidine	UG/L	---	---	---	---	---	---	---	< 5 U
3-Nitroaniline	UG/L	---	---	---	---	---	---	---	< 1 U
4,4'-Methylenebis(2-chloroaniline)	UG/L	---	---	---	---	---	---	---	< 14 UJ
4,4'-Methylenebis(N,N-dimethylanilin	UG/L	---	---	---	---	---	---	---	< 14 U
4,6-Dinitro-2-methylphenol	UG/L	---	---	---	---	---	---	---	< 14 U
4-Bromophenyl phenyl ether	UG/L	---	---	---	---	---	---	---	< 1 U
4-Chloro-3-methylphenol	UG/L	---	---	---	---	---	---	---	< 1 U
4-Chloroaniline	UG/L	---	---	---	---	---	---	---	< 1 U
4-Chlorophenyl phenyl ether	UG/L	---	---	---	---	---	---	---	< 1 U
4-Methylphenol	UG/L	---	---	---	---	---	---	---	< 1 U
4-Nitroaniline	UG/L	---	---	---	---	---	---	---	< 1 U
4-Nitrophenol	UG/L	---	---	---	---	---	---	---	< 29 U
Acenaphthene	UG/L	---	---	---	---	---	---	---	< 0.5 U
Acenaphthylene	UG/L	---	---	---	---	---	---	---	< 0.5 U
Acetophenone	UG/L	---	---	---	---	---	---	---	< 1 U
Adamantane	UG/L	---	---	---	---	---	---	---	< 5 U
Aniline	UG/L	---	---	---	---	---	---	---	< 1 U
Anthracene	UG/L	---	---	---	---	---	---	---	< 0.5 U
Benzo (a) anthracene	UG/L	---	---	---	---	---	---	---	< 0.5 U
Benzo (a) pyrene	UG/L	---	---	---	---	---	---	---	< 0.5 U
Benzo (b) fluoranthene	UG/L	---	---	---	---	---	---	---	< 0.5 U
Benzo (g,h,i) perylene	UG/L	---	---	---	---	---	---	---	< 0.5 U
Benzo (k) fluoranthene	UG/L	---	---	---	---	---	---	---	< 0.5 U
Benzoic acid	UG/L	---	---	---	---	---	---	---	< 14 U
Benzyl alcohol	UG/L	---	---	---	---	---	---	---	< 14 U
Bis(2-chloroethoxy)methane	UG/L	---	---	---	---	---	---	---	< 1 U
Bis(2-chloroethyl)ether	UG/L	---	---	---	---	---	---	---	< 1 U
bis(2-Chloroisopropyl)ether	UG/L	---	---	---	---	---	---	---	< 1 U
Bis(2-ethylhexyl)phthalate	UG/L	---	---	---	---	---	---	---	< 5 U
Butyl benzyl phthalate	UG/L	---	---	---	---	---	---	---	< 5 U
Carbazole	UG/L	---	---	---	---	---	---	---	< 1 U
Chlorobenzilate	UG/L	---	---	---	---	---	---	---	< 10 U
Chrysene	UG/L	---	---	---	---	---	---	---	< 0.5 U
Diallate (cis or trans)	UG/L	---	---	---	---	---	---	---	< 5 U
Dibenz (a,h) anthracene	UG/L	---	---	---	---	---	---	---	< 0.5 U
Dibenzofuran	UG/L	---	---	---	---	---	---	---	< 1 U
Diethyl phthalate	UG/L	---	---	---	---	---	---	---	< 5 U
Dimethyl phthalate	UG/L	---	---	---	---	---	---	---	< 5 U
Di-n-butyl phthalate	UG/L	---	---	---	---	---	---	---	< 5 U
Di-n-octyl phthalate	UG/L	---	---	---	---	---	---	---	< 5 U
Dinoseb	UG/L	---	---	---	---	---	---	---	< 5 U
Disulfoton	UG/L	---	---	---	---	---	---	---	< 48 U
d-Limonene	UG/L	---	---	---	---	---	---	---	< 5 U
Fluoranthene	UG/L	---	---	---	---	---	---	---	< 0.5 U
Fluorene	UG/L	---	---	---	---	---	---	---	< 0.5 U
Hexachlorobenzene	UG/L	---	---	---	---	---	---	---	< 0.5 U
Hexachlorobutadiene	UG/L	---	---	---	---	---	---	---	< 1 U
Hexachlorocyclopentadiene	UG/L	---	---	---	---	---	---	---	< 14 U
Hexachloroethane	UG/L	---	---	---	---	---	---	---	< 5 U
Indeno (1,2,3-cd) pyrene	UG/L	---	---	---	---	---	---	---	< 0.5 U
Isophorone	UG/L	---	---	---	---	---	---	---	< 1 U
Naphthalene	UG/L	---	---	---	---	---	---	---	< 0.5 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER G

Property Owner		PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G
Location Description		THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN
Sampled Before Treatment?		NA	NA	NA	NA	NA	Pre-Treatment	Post-Treatment	Pre-Treatment
Sample ID		NTD0310-04022010-0840	1001201021403	1110201020203	0628201122901	0901201120204	1013201120201	1013201120202	1027201120204
Parameter and units	Sample Date	4/2/2010 (Baseline)	10/1/2010	11/10/2010	6/28/2011	9/1/2011	10/13/2011	10/13/2011	10/27/2011
Nitrobenzene	UG/L	---	---	---	---	---	---	---	< 1 U
N-Nitrosodiethylamine	UG/L	---	---	---	---	---	---	---	< 1 U
N-Nitrosodimethylamine	UG/L	---	---	---	---	---	---	---	< 5 U
N-Nitrosodi-n-butylamine	UG/L	---	---	---	---	---	---	---	< 5 U
N-Nitrosodi-n-propylamine	UG/L	---	---	---	---	---	---	---	< 1 U
N-Nitrosodiphenylamine	UG/L	---	---	---	---	---	---	---	< 1 U
N-Nitrosomethylethylamine	UG/L	---	---	---	---	---	---	---	< 5 U
Parathion-ethyl	UG/L	---	---	---	---	---	---	---	< 5 U
Parathion-methyl	UG/L	---	---	---	---	---	---	---	< 5 U
Pentachlorobenzene	UG/L	---	---	---	---	---	---	---	< 1 U
Pentachlorophenol	UG/L	---	---	---	---	---	---	---	< 5 U
Phenanthrene	UG/L	---	---	---	---	---	---	---	< 0.5 U
Phenol	UG/L	---	---	---	---	---	---	---	< 1 U
Phorate	UG/L	---	---	---	---	---	---	---	< 1 U
Pronamide	UG/L	---	---	---	---	---	---	---	< 1 U
Pyrene	UG/L	---	---	---	---	---	---	---	< 0.5 U
Pyridine	UG/L	---	---	---	---	---	---	---	< 5 U
Squalene	UG/L	---	---	---	---	---	---	---	< 5 U
Terbufos	UG/L	---	---	---	---	---	---	---	< 5 U
Terpineol	UG/L	---	---	---	---	---	---	---	< 5 U
Tributoxyethyl phosphate	UG/L	---	---	---	---	---	---	---	< 5 U
Trifluralin	UG/L	---	---	---	---	---	---	---	< 5 U
TICs									
1,2,3-Trimethylbenzene	UG/L	---	---	---	---	---	---	---	---
Volatile Organics									
1,1,1-Trichloroethane	UG/L	---	---	---	---	---	---	---	< 1.00 U
1,1,2-Trichloroethane	UG/L	---	---	---	---	---	---	---	< 1.00 U
1,1-Dichloroethane	UG/L	---	---	---	---	---	---	---	< 1.00 U
1,1-Dichloroethene	UG/L	---	---	---	---	---	---	---	< 1.00 U
1,2,3-Trimethylbenzene	UG/L	---	---	---	---	---	---	---	< 1.00 U
1,2,4-Trichlorobenzene	UG/L	---	---	---	---	---	---	---	---
1,2,4-Trimethylbenzene	UG/L	---	---	---	---	---	---	---	< 1.00 U
1,2-Dibromo-3-chloropropane	UG/L	---	---	---	---	---	---	---	< 0.1014 U
1,2-Dichlorobenzene	UG/L	---	---	---	---	---	---	---	< 1.00 U
1,2-Dichloroethane	UG/L	---	---	---	---	---	---	---	< 1.00 U
1,2-Dichloropropane	UG/L	---	---	---	---	---	---	---	---
1,3,5-Trimethylbenzene	UG/L	---	---	---	---	---	---	---	< 1.00 U
1,3-Dichlorobenzene	UG/L	---	---	---	---	---	---	---	< 1.00 U
1,4-Dichlorobenzene	UG/L	---	---	---	---	---	---	---	< 1.00 U
Acetone	UG/L	---	---	---	---	---	---	---	< 50.0 U
Benzene	UG/L	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 1.00 U
Carbon disulfide	UG/L	---	---	---	---	---	---	---	< 1.00 U
Carbon Tetrachloride	UG/L	---	---	---	---	---	---	---	< 1.00 U
Chlorobenzene	UG/L	---	---	---	---	---	---	---	< 1.00 U
Chloroform	UG/L	---	---	---	---	---	---	---	< 1.00 U
cis-1,2-Dichloroethene	UG/L	---	---	---	---	---	---	---	< 1.00 U
Diisopropyl Ether	UG/L	---	---	---	---	---	---	---	< 1.00 U
Ethanol	UG/L	---	---	---	---	---	---	---	< 100 U
Ethyl tert-Butyl Ether	UG/L	---	---	---	---	---	---	---	< 1.00 U
Ethylbenzene	UG/L	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 1.00 U
Hexachlorobutadiene	UG/L	---	---	---	---	---	---	---	< 1 U
Isopropyl alcohol	UG/L	---	---	---	---	---	---	---	< 50.0 U
Isopropylbenzene	UG/L	---	---	---	---	---	---	---	< 1.00 U
m,p-Xylene	UG/L	---	---	---	---	---	---	---	< 2.00 U
Methoxychlor	UG/L	---	---	---	---	---	---	---	< 0.0472 U
Methyl tert-Butyl Ether	UG/L	---	---	---	---	---	---	---	< 1.00 U
Methylene Chloride	UG/L	---	---	---	---	---	---	---	< 5.00 U
Naphthalene	UG/L	---	---	---	---	---	---	---	< 5.00 U
o-Xylene	UG/L	---	---	---	---	---	---	---	< 1.00 U
Styrene	UG/L	---	---	---	---	---	---	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER G

	Property Owner	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G	PROPERTY OWNER G
	Location Description	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE HOUSE.
	Source Type	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
	Well Depth	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN
	Sampled Before Treatment?	NA	NA	NA	NA	NA	Pre-Treatment	Post-Treatment	Pre-Treatment
	Sample ID	NTD0310-04022010-0840	1001201021403	1110201020203	0628201122901	0901201120204	1013201120201	1013201120202	1027201120204
Parameter and units	Sample Date	4/2/2010 (Baseline)	10/1/2010	11/10/2010	6/28/2011	9/1/2011	10/13/2011	10/13/2011	10/27/2011
Tert-Amyl Methyl Ether	UG/L	---	---	---	---	---	---	---	< 1.00 U
Tertiary Butyl Alcohol	UG/L	---	---	---	---	---	---	---	< 10.0 U
Tetrachloroethene	UG/L	---	---	---	---	---	---	---	< 1.00 U
Tetrahydrofuran	UG/L	---	---	---	---	---	---	---	---
Toluene	UG/L	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 1.00 U
trans-1,2-Dichloroethene	UG/L	---	---	---	---	---	---	---	< 1.00 U
Trichloroethene	UG/L	---	---	---	---	---	---	---	< 1.00 U
Vinyl chloride	UG/L	---	---	---	---	---	---	---	< 1.00 U
Xylenes, total	UG/L	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 3.00 U

Notes:

U : Parameter not detected at posted limit
< : Parameter not detected at posted limit
ND : Parameter not detected
H : Parameter analyzed beyond method recommended holding time
J : Estimated value
--- : Parameter not analyzed.
B : Blank qualified
ug/L : Micrograms per liter
mg/L : Milligrams per liter
NA : Not Available
NTU : Nephelometric Turbidity Unit
umho/cm : Micromhos per centimeter
colonies/100 ml : Colonies per 100 millileters

APPENDIX A-8
EPA STUDY WELL DATA
PROPERTY OWNER H

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER H

Property Owner		PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H
Location Description		907691-PROPERTY OWNER H-001	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		340	340	340	340	340	340	340	340	340
Sampled Before Treatment?		NA	NA	Pre-Treatment	NA	NA	Pre-Treatment	Post-Treatment	Pre-Treatment	Post-Treatment
Sample ID		NTD0189-04012010-1125	0913201020201	1001201021405	1110201020201	1202201020201	0301201124902	0301201124903	0510201120201	0510201120202
Parameter and units	Sample Date	4/1/2010 (Baseline)	9/13/2010	10/1/2010	11/10/2010	12/2/2010	3/1/2011	3/1/2011	5/10/2011	5/10/2011
Aldehydes										
Gluteraldehyde	UG/L	---	---	---	---	---	---	---	---	---
Bacteria										
E. coli	colonies/100ml	---	---	---	---	---	---	---	---	---
Fecal coliform bacteria	colonies/100ml	---	---	---	---	---	---	---	---	---
Total Coliform Bacteria	colonies/100ml	---	---	---	---	---	---	---	---	---
DBCP										
1,2-Dibromo-3-chloropropane	UG/L	---	---	---	---	---	---	---	---	---
Extractable Petroleum Hydrocarbons										
Diesel	UG/L	---	---	---	---	---	---	---	---	---
General Chemistry										
Alkalinity, Total (CaCO3)	MG/L	---	---	---	---	---	---	---	---	---
Ammonia as N	MG/L	---	---	---	---	---	---	---	---	---
Bicarbonate Alkalinity as CaCO3	MG/L	101	141	60.2	93.6	75.8	35.2	36.5	42.3	44.9
Bromide	MG/L	---	---	---	---	---	---	---	---	---
Carbonate as CaCO3	MG/L	< 10.0 U	< 10.0 U	< 10.0 U	< 10.0 U	< 10.0 U	< 10.0 U	< 10.0 U	< 10.0 U	< 10.0 U
Chloride	MG/L	1.52	10.2	< 5.00 UJ	8.34	12.4	5	5.08	< 5.00 U	< 5.00 UJ
CO2 by Headspace	UG/L	---	---	---	---	---	---	---	---	---
Cyanide	MG/L	---	---	---	< 0.0500 U	---	---	---	---	---
Fluoride	MG/L	---	---	---	---	---	---	---	---	---
MBAS	MG/L	< 0.0500 U	< 0.0500 U	< 0.0500 U	0.0516	< 0.0500 U	< 0.0500 U	< 0.0500 U	< 0.0500 U	< 0.0500 U
Nitrate	MG/L	---	---	---	---	---	---	---	---	---
Nitrate Nitrogen	MG/L	---	---	---	---	---	---	---	---	---
Nitrite Nitrogen	MG/L	---	---	---	---	---	---	---	---	---
Oil & Grease HEM	MG/L	< 5.49 U	< 5.43 U	< 6.10 U	< 5.49 U	< 6.10 U	< 5.95 U	< 6.02 U	< 5.81 U	< 6.49 U
pH	pH UNITS	7.70 H	8.20 HJ	6.80 HJ	6.80 HJ	6.70 H	7.40 HJ	7.20 HJ	7.80 HJ	7.00 HJ
Phosphorus	MG/L	---	---	---	---	---	---	---	---	---
Specific conductance	UMHO/CM	191	325	112	189	124	107	108	129	133
Sulfate	MG/L	13.7	15.9	10.8 J	17.1	21.5	17.1	19	17.2	17.4 J
Temperature of pH determination	CELSIUS	23.0 H	22.4 HJ	21.4 HJ	21.9 HJ	22.5 H	21.0 HJ	21.4 HJ	23.9 HJ	23.5 HJ
Total Dissolved Solids	MG/L	118	176	250	107	76	70	76	82	65
Total Suspended Solids	MG/L	< 1.00 U	27.5	46	88.3	33.4	2.1	< 1.00 U	1.70 J	1.1
Turbidity	NTU	2	2.7	31.2	26.4	11.7	5	4.5	7.3	3.6
Glycols										
1,2-Propylene Glycol	MG/L	---	---	---	---	---	---	---	---	---
Diethylene Glycol	MG/L	---	---	---	---	---	---	---	---	---
Ethylene Glycol	MG/L	---	---	---	---	---	---	---	---	---
Tetraethylene glycol	MG/L	---	---	---	---	---	---	---	---	---
Triethylene glycol	MG/L	---	---	---	---	---	---	---	---	---
Light Gases										
Acetylene	MG/L	---	---	---	---	---	---	---	---	---
Ethane	MG/L	< 0.0260 U	< 0.0260 U	< 0.0260 U	< 0.0260 U	< 0.0260 U	< 0.0260 U	< 0.0260 U	< 0.0260 U	< 0.0260 U
Ethene	MG/L	---	---	---	---	---	---	---	---	---
Methane	MG/L	0.045	0.0535	< 0.0260 U	0.183	< 0.0260 U	< 0.0260 U	< 0.0260 U	< 0.0260 U	< 0.0260 U
n-Butane	MG/L	---	---	---	---	---	---	---	---	---
Propane	MG/L	< 0.0340 U	< 0.0340 U	< 0.0340 U	< 0.0340 U	< 0.0340 U	< 0.0340 U	< 0.0340 U	< 0.0340 U	< 0.0340 U
Low Molecular Weight Acids										
Acetic Acid	UG/L	---	---	---	---	---	---	---	---	---
Butyric Acid	UG/L	---	---	---	---	---	---	---	---	---
Formic Acid	UG/L	---	---	---	---	---	---	---	---	---
Isobutyric acid	UG/L	---	---	---	---	---	---	---	---	---
Lactic acid	UG/L	---	---	---	---	---	---	---	---	---
Propionic Acid	UG/L	---	---	---	---	---	---	---	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER H

Property Owner		PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H
Location Description		907691-PROPERTY OWNER H-001	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		340	340	340	340	340	340	340	340	340
Sampled Before Treatment?		NA	NA	Pre-Treatment	NA	NA	Pre-Treatment	Post-Treatment	Pre-Treatment	Post-Treatment
Sample ID		NTD0189-04012010-1125	0913201020201	1001201021405	1110201020201	1202201020201	0301201124902	0301201124903	0510201120201	0510201120202
Parameter and units	Sample Date	4/1/2010 (Baseline)	9/13/2010	10/1/2010	11/10/2010	12/2/2010	3/1/2011	3/1/2011	5/10/2011	5/10/2011
Metals, 6020x										
Cesium	MG/L	---	---	---	---	---	---	---	---	---
Cesium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Potassium	MG/L	---	---	---	---	---	---	---	---	---
Potassium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Silicon	MG/L	---	---	---	---	---	---	---	---	---
Silicon, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Thorium	MG/L	---	---	---	---	---	---	---	---	---
Thorium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Uranium	MG/L	---	---	---	---	---	---	---	---	---
Uranium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Metals, Total										
Aluminum	MG/L	---	---	---	---	---	---	---	---	---
Antimony	MG/L	---	---	---	---	---	---	---	---	---
Arsenic	MG/L	< 0.0100 U	< 0.0100 U	< 0.0100 U	< 0.0100 U	< 0.0100 U	< 0.0100 U	< 0.0100 U	< 0.0100 U	< 0.0100 U
Barium	MG/L	0.214	0.31	0.263	0.27	0.17	0.168	0.142	0.162	0.164
Beryllium	MG/L	---	---	---	---	---	---	---	---	---
Boron	MG/L	---	---	---	---	---	---	---	---	---
Cadmium	MG/L	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U
Calcium	MG/L	12.4	24.3	15.1	14.8	31.3	13.3	13.7	14.7	15.1
Chromium	MG/L	< 0.00500 U	< 0.00500 U	< 0.00500 U	< 0.00500 U	< 0.00500 U	< 0.00500 U	< 0.00500 U	< 0.00500 U	< 0.00500 U
Cobalt	MG/L	---	---	---	---	---	---	---	---	---
Copper	MG/L	---	---	---	---	---	---	---	---	---
Hardness, CaCO3	MG/L	---	---	---	---	---	---	---	---	---
Iron	MG/L	0.0546	0.275	2.54	0.982	0.829	0.228	0.0971	0.149	0.0756
Lead	MG/L	< 0.00500 U	< 0.00500 U	< 0.00500 U	0.0089	< 0.00500 U	0.0076	< 0.00500 U	0.0738	< 0.00500 U
Lithium	MG/L	---	---	---	---	---	---	---	---	---
Magnesium	MG/L	1.97	3.56	2.64	2.2	4.21	1.95	1.99	2.41	2.48
Manganese	MG/L	< 0.0150 U	0.0209	0.214	0.0607	0.095	< 0.0150 U	< 0.0150 U	< 0.0150 U	< 0.0150 U
Mercury	MG/L	< 0.000200 U	< 0.000200 U	< 0.000200 U	< 0.000200 U	< 0.000200 U	< 0.000200 U	< 0.000200 U	< 0.000200 U	< 0.000200 U
Molybdenum	MG/L	---	---	---	---	---	---	---	---	---
Nickel	MG/L	---	---	---	---	---	---	---	---	---
Potassium	MG/L	< 1.00 U	1.41	1.31	1.16	1.47	< 1.00 U	< 1.00 U	< 1.00 U	< 1.00 U
Selenium	MG/L	< 0.0100 U	< 0.0100 U	< 0.0100 U	< 0.0100 U	< 0.0100 U	< 0.0100 U	< 0.0100 U	< 0.0100 U	< 0.0100 U
Silver	MG/L	< 0.00500 U	< 0.00500 U	< 0.00500 U	< 0.00500 U	< 0.00500 U	< 0.00500 U	< 0.00500 U	< 0.00500 U	< 0.00500 U
Sodium	MG/L	28	40.4	6.84	20.8	7.24	5.02	5.21	5.56	5.35
Strontium	MG/L	---	---	---	---	---	---	---	---	---
Sulfur	MG/L	5.1	3.7	3.4	6	4.5	4.66	4.59	4.36	4.42
Thallium	MG/L	---	---	---	---	---	---	---	---	---
Titanium	MG/L	---	---	---	---	---	---	---	---	---
Vanadium	MG/L	---	---	---	---	---	---	---	---	---
Zinc	MG/L	---	---	---	---	---	---	---	---	---
Metals, Dissolved										
Aluminum, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Antimony, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Arsenic, Dissolved	MG/L	---	---	---	< 0.0100 U	---	---	---	---	---
Barium, Dissolved	MG/L	---	---	---	0.218	---	---	---	---	---
Beryllium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Boron, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Cadmium, Dissolved	MG/L	---	---	---	< 0.00100 U	---	---	---	---	---
Calcium, Dissolved	MG/L	---	---	---	17.1	---	---	---	---	---
Chromium, Dissolved	MG/L	---	---	---	< 0.00500 U	---	---	---	---	---
Cobalt, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Copper, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Iron, Dissolved	MG/L	---	---	< 0.0500 U	< 0.0500 U	---	---	---	---	---
Lead, Dissolved	MG/L	---	---	---	< 0.00500 U	---	---	---	---	---
Magnesium, Dissolved	MG/L	---	---	---	2.56	---	---	---	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER H

Property Owner		PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H
Location Description		907691-PROPERTY OWNER H-001	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		340	340	340	340	340	340	340	340	340
Sampled Before Treatment?		NA	NA	Pre-Treatment	NA	NA	Pre-Treatment	Post-Treatment	Pre-Treatment	Post-Treatment
Sample ID		NTD0189-04012010-1125	0913201020201	1001201021405	1110201020201	1202201020201	0301201124902	0301201124903	0510201120201	0510201120202
Parameter and units	Sample Date	4/1/2010 (Baseline)	9/13/2010	10/1/2010	11/10/2010	12/2/2010	3/1/2011	3/1/2011	5/10/2011	5/10/2011
Manganese, Dissolved	MG/L	---	---	---	0.0213	---	---	---	---	---
Mercury, Dissolved	MG/L	---	---	---	< 0.000200 U	---	---	---	---	---
Molybdenum, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Nickel, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Potassium, Dissolved	MG/L	---	---	---	1.26	---	---	---	---	---
Selenium, Dissolved	MG/L	---	---	---	< 0.0100 U	---	---	---	---	---
Silver, Dissolved	MG/L	---	---	---	< 0.00500 U	---	---	---	---	---
Sodium, Dissolved	MG/L	---	---	---	21.9	---	---	---	---	---
Strontium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Sulfur, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Thallium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Titanium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Vanadium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Zinc, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Miscellaneous Organics										
Inorganic Carbon, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Organic Carbon, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Pesticides and PCBs										
4,4'-DDD	UG/L	---	---	---	---	---	---	---	---	---
4,4'-DDE	UG/L	---	---	---	---	---	---	---	---	---
4,4'-DDT	UG/L	---	---	---	---	---	---	---	---	---
Aldrin	UG/L	---	---	---	---	---	---	---	---	---
alpha-BHC	UG/L	---	---	---	---	---	---	---	---	---
Azinphos-methyl	UG/L	---	---	---	---	---	---	---	---	---
beta-BHC	UG/L	---	---	---	---	---	---	---	---	---
Carbaryl	UG/L	---	---	---	---	---	---	---	---	---
delta-BHC	UG/L	---	---	---	---	---	---	---	---	---
Dichlorvos	UG/L	---	---	---	---	---	---	---	---	---
Dieldrin	UG/L	---	---	---	---	---	---	---	---	---
Disulfoton	UG/L	---	---	---	---	---	---	---	---	---
Endosulfan I	UG/L	---	---	---	---	---	---	---	---	---
Endosulfan II	UG/L	---	---	---	---	---	---	---	---	---
Endosulfan sulfate	UG/L	---	---	---	---	---	---	---	---	---
Endrin	UG/L	---	---	---	---	---	---	---	---	---
Endrin aldehyde	UG/L	---	---	---	---	---	---	---	---	---
Endrin ketone	UG/L	---	---	---	---	---	---	---	---	---
gamma-BHC (Lindane)	UG/L	---	---	---	---	---	---	---	---	---
Heptachlor	UG/L	---	---	---	---	---	---	---	---	---
Heptachlor epoxide	UG/L	---	---	---	---	---	---	---	---	---
Malathion	UG/L	---	---	---	---	---	---	---	---	---
Methoxychlor	UG/L	---	---	---	---	---	---	---	---	---
Mevinphos	UG/L	---	---	---	---	---	---	---	---	---
Purgeable Petroleum Hydrocarbons										
GRO as Gasoline	UG/L	---	---	---	---	---	---	---	---	---
Semivolatile Organics										
1,2,4,5-Tetrachlorobenzene	UG/L	---	---	---	---	---	---	---	---	---
1,2-Dinitrobenzene	UG/L	---	---	---	---	---	---	---	---	---
1,2-Diphenylhydrazine	UG/L	---	---	---	---	---	---	---	---	---
1,3-Dimethyl adamatane	UG/L	---	---	---	---	---	---	---	---	---
1,3-Dinitrobenzene	UG/L	---	---	---	---	---	---	---	---	---
1,4-Dinitrobenzene	UG/L	---	---	---	---	---	---	---	---	---
1-Chloronaphthalene	UG/L	---	---	---	---	---	---	---	---	---
2,3,4,6-Tetrachlorophenol	UG/L	---	---	---	---	---	---	---	---	---
2,4,5-Trichlorophenol	UG/L	---	---	---	---	---	---	---	---	---
2,4,6-Trichlorophenol	UG/L	---	---	---	---	---	---	---	---	---
2,4-Dichlorophenol	UG/L	---	---	---	---	---	---	---	---	---
2,4-Dimethylphenol	UG/L	---	---	---	---	---	---	---	---	---
2,4-Dinitrophenol	UG/L	---	---	---	---	---	---	---	---	---
2,4-Dinitrotoluene	UG/L	---	---	---	---	---	---	---	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER H

Property Owner		PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H
Location Description		907691-PROPERTY OWNER H-001	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		340	340	340	340	340	340	340	340	340
Sampled Before Treatment?		NA	NA	Pre-Treatment	NA	NA	Pre-Treatment	Post-Treatment	Pre-Treatment	Post-Treatment
Sample ID		NTD0189-04012010-1125	0913201020201	1001201021405	1110201020201	1202201020201	0301201124902	0301201124903	0510201120201	0510201120202
Parameter and units	Sample Date	4/1/2010 (Baseline)	9/13/2010	10/1/2010	11/10/2010	12/2/2010	3/1/2011	3/1/2011	5/10/2011	5/10/2011
2,6-Dichlorophenol	UG/L	---	---	---	---	---	---	---	---	---
2,6-Dinitrotoluene	UG/L	---	---	---	---	---	---	---	---	---
2-Butoxyethanol	UG/L	---	---	---	---	---	---	---	---	---
2-Chloronaphthalene	UG/L	---	---	---	---	---	---	---	---	---
2-Chlorophenol	UG/L	---	---	---	---	---	---	---	---	---
2-Methylnaphthalene	UG/L	---	---	---	---	---	---	---	---	---
2-Methylphenol	UG/L	---	---	---	---	---	---	---	---	---
2-Nitroaniline	UG/L	---	---	---	---	---	---	---	---	---
2-Nitrophenol	UG/L	---	---	---	---	---	---	---	---	---
3,3-Dichlorobenzidine	UG/L	---	---	---	---	---	---	---	---	---
3-Nitroaniline	UG/L	---	---	---	---	---	---	---	---	---
4,4'-Methylenebis(2-chloroaniline)	UG/L	---	---	---	---	---	---	---	---	---
4,4'-Methylenebis(N,N-dimethylanilin	UG/L	---	---	---	---	---	---	---	---	---
4,6-Dinitro-2-methylphenol	UG/L	---	---	---	---	---	---	---	---	---
4-Bromophenyl phenyl ether	UG/L	---	---	---	---	---	---	---	---	---
4-Chloro-3-methylphenol	UG/L	---	---	---	---	---	---	---	---	---
4-Chloroaniline	UG/L	---	---	---	---	---	---	---	---	---
4-Chlorophenyl phenyl ether	UG/L	---	---	---	---	---	---	---	---	---
4-Methylphenol	UG/L	---	---	---	---	---	---	---	---	---
4-Nitroaniline	UG/L	---	---	---	---	---	---	---	---	---
4-Nitrophenol	UG/L	---	---	---	---	---	---	---	---	---
Acenaphthene	UG/L	---	---	---	---	---	---	---	---	---
Acenaphthylene	UG/L	---	---	---	---	---	---	---	---	---
Acetophenone	UG/L	---	---	---	---	---	---	---	---	---
Adamantane	UG/L	---	---	---	---	---	---	---	---	---
Aniline	UG/L	---	---	---	---	---	---	---	---	---
Anthracene	UG/L	---	---	---	---	---	---	---	---	---
Benzo (a) anthracene	UG/L	---	---	---	---	---	---	---	---	---
Benzo (a) pyrene	UG/L	---	---	---	---	---	---	---	---	---
Benzo (b) fluoranthene	UG/L	---	---	---	---	---	---	---	---	---
Benzo (g,h,i) perylene	UG/L	---	---	---	---	---	---	---	---	---
Benzo (k) fluoranthene	UG/L	---	---	---	---	---	---	---	---	---
Benzoic acid	UG/L	---	---	---	---	---	---	---	---	---
Benzyl alcohol	UG/L	---	---	---	---	---	---	---	---	---
Bis(2-chloroethoxy)methane	UG/L	---	---	---	---	---	---	---	---	---
Bis(2-chloroethyl)ether	UG/L	---	---	---	---	---	---	---	---	---
bis(2-Chloroisopropyl)ether	UG/L	---	---	---	---	---	---	---	---	---
Bis(2-ethylhexyl)phthalate	UG/L	---	---	---	---	---	---	---	---	---
Butyl benzyl phthalate	UG/L	---	---	---	---	---	---	---	---	---
Carbazole	UG/L	---	---	---	---	---	---	---	---	---
Chlorobenzilate	UG/L	---	---	---	---	---	---	---	---	---
Chrysene	UG/L	---	---	---	---	---	---	---	---	---
Diallate (cis or trans)	UG/L	---	---	---	---	---	---	---	---	---
Dibenz (a,h) anthracene	UG/L	---	---	---	---	---	---	---	---	---
Dibenzofuran	UG/L	---	---	---	---	---	---	---	---	---
Diethyl phthalate	UG/L	---	---	---	---	---	---	---	---	---
Dimethyl phthalate	UG/L	---	---	---	---	---	---	---	---	---
Di-n-butyl phthalate	UG/L	---	---	---	---	---	---	---	---	---
Di-n-octyl phthalate	UG/L	---	---	---	---	---	---	---	---	---
Dinoseb	UG/L	---	---	---	---	---	---	---	---	---
Disulfoton	UG/L	---	---	---	---	---	---	---	---	---
d-Limonene	UG/L	---	---	---	---	---	---	---	---	---
Fluoranthene	UG/L	---	---	---	---	---	---	---	---	---
Fluorene	UG/L	---	---	---	---	---	---	---	---	---
Hexachlorobenzene	UG/L	---	---	---	---	---	---	---	---	---
Hexachlorobutadiene	UG/L	---	---	---	---	---	---	---	---	---
Hexachlorocyclopentadiene	UG/L	---	---	---	---	---	---	---	---	---
Hexachloroethane	UG/L	---	---	---	---	---	---	---	---	---
Indeno (1,2,3-cd) pyrene	UG/L	---	---	---	---	---	---	---	---	---
Isophorone	UG/L	---	---	---	---	---	---	---	---	---
Naphthalene	UG/L	---	---	---	---	---	---	---	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER H

Property Owner		PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H
Location Description		907691-PROPERTY OWNER H-001	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		340	340	340	340	340	340	340	340	340
Sampled Before Treatment?		NA	NA	Pre-Treatment	NA	NA	Pre-Treatment	Post-Treatment	Pre-Treatment	Post-Treatment
Sample ID		NTD0189-04012010-1125	0913201020201	1001201021405	1110201020201	1202201020201	0301201124902	0301201124903	0510201120201	0510201120202
Parameter and units	Sample Date	4/1/2010 (Baseline)	9/13/2010	10/1/2010	11/10/2010	12/2/2010	3/1/2011	3/1/2011	5/10/2011	5/10/2011
Nitrobenzene	UG/L	---	---	---	---	---	---	---	---	---
N-Nitrosodiethylamine	UG/L	---	---	---	---	---	---	---	---	---
N-Nitrosodimethylamine	UG/L	---	---	---	---	---	---	---	---	---
N-Nitrosodi-n-butylamine	UG/L	---	---	---	---	---	---	---	---	---
N-Nitrosodi-n-propylamine	UG/L	---	---	---	---	---	---	---	---	---
N-Nitrosodiphenylamine	UG/L	---	---	---	---	---	---	---	---	---
N-Nitrosomethylethylamine	UG/L	---	---	---	---	---	---	---	---	---
Parathion-ethyl	UG/L	---	---	---	---	---	---	---	---	---
Parathion-methyl	UG/L	---	---	---	---	---	---	---	---	---
Pentachlorobenzene	UG/L	---	---	---	---	---	---	---	---	---
Pentachlorophenol	UG/L	---	---	---	---	---	---	---	---	---
Phenanthrene	UG/L	---	---	---	---	---	---	---	---	---
Phenol	UG/L	---	---	---	---	---	---	---	---	---
Phorate	UG/L	---	---	---	---	---	---	---	---	---
Pronamide	UG/L	---	---	---	---	---	---	---	---	---
Pyrene	UG/L	---	---	---	---	---	---	---	---	---
Pyridine	UG/L	---	---	---	---	---	---	---	---	---
Squalene	UG/L	---	---	---	---	---	---	---	---	---
Terbufos	UG/L	---	---	---	---	---	---	---	---	---
Terpineol	UG/L	---	---	---	---	---	---	---	---	---
Tributoxyethyl phosphate	UG/L	---	---	---	---	---	---	---	---	---
Trifluralin	UG/L	---	---	---	---	---	---	---	---	---
TICs										
1,2,3-Trimethylbenzene	UG/L	---	---	---	---	---	---	---	---	---
Volatile Organics										
1,1,1-Trichloroethane	UG/L	---	---	---	---	---	---	---	---	---
1,1,2-Trichloroethane	UG/L	---	---	---	---	---	---	---	---	---
1,1-Dichloroethane	UG/L	---	---	---	---	---	---	---	---	---
1,1-Dichloroethene	UG/L	---	---	---	---	---	---	---	---	---
1,2,3-Trimethylbenzene	UG/L	---	---	---	---	---	---	---	---	---
1,2,4-Trichlorobenzene	UG/L	---	---	---	---	---	---	---	---	---
1,2,4-Trimethylbenzene	UG/L	---	---	---	---	---	---	---	---	---
1,2-Dibromo-3-chloropropane	UG/L	---	---	---	---	---	---	---	---	---
1,2-Dichlorobenzene	UG/L	---	---	---	---	---	---	---	---	---
1,2-Dichloroethane	UG/L	---	---	---	---	---	---	---	---	---
1,2-Dichloropropane	UG/L	---	---	---	---	---	---	---	---	---
1,3,5-Trimethylbenzene	UG/L	---	---	---	---	---	---	---	---	---
1,3-Dichlorobenzene	UG/L	---	---	---	---	---	---	---	---	---
1,4-Dichlorobenzene	UG/L	---	---	---	---	---	---	---	---	---
Acetone	UG/L	---	---	---	---	---	---	---	---	---
Benzene	UG/L	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U
Carbon disulfide	UG/L	---	---	---	---	---	---	---	---	---
Carbon Tetrachloride	UG/L	---	---	---	---	---	---	---	---	---
Chlorobenzene	UG/L	---	---	---	---	---	---	---	---	---
Chloroform	UG/L	---	---	---	---	---	---	---	---	---
cis-1,2-Dichloroethene	UG/L	---	---	---	---	---	---	---	---	---
Diisopropyl Ether	UG/L	---	---	---	---	---	---	---	---	---
Ethanol	UG/L	---	---	---	---	---	---	---	---	---
Ethyl tert-Butyl Ether	UG/L	---	---	---	---	---	---	---	---	---
Ethylbenzene	UG/L	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U
Hexachlorobutadiene	UG/L	---	---	---	---	---	---	---	---	---
Isopropyl alcohol	UG/L	---	---	---	---	---	---	---	---	---
Isopropylbenzene	UG/L	---	---	---	---	---	---	---	---	---
m,p-Xylene	UG/L	---	---	---	---	---	---	---	---	---
Methoxychlor	UG/L	---	---	---	---	---	---	---	---	---
Methyl tert-Butyl Ether	UG/L	---	---	---	---	---	---	---	---	---
Methylene Chloride	UG/L	---	---	---	---	---	---	---	---	---
Naphthalene	UG/L	---	---	---	---	---	---	---	---	---
o-Xylene	UG/L	---	---	---	---	---	---	---	---	---
Styrene	UG/L	---	---	---	---	---	---	---	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER H

Property Owner		PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H
Location Description		907691-PROPERTY OWNER H-001	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		340	340	340	340	340	340	340	340	340
Sampled Before Treatment?		NA	NA	Pre-Treatment	NA	NA	Pre-Treatment	Post-Treatment	Pre-Treatment	Post-Treatment
Sample ID		NTD0189-04012010-1125	0913201020201	1001201021405	1110201020201	1202201020201	0301201124902	0301201124903	0510201120201	0510201120202
Parameter and units	Sample Date	4/1/2010 (Baseline)	9/13/2010	10/1/2010	11/10/2010	12/2/2010	3/1/2011	3/1/2011	5/10/2011	5/10/2011
Tert-Amyl Methyl Ether	UG/L	---	---	---	---	---	---	---	---	---
Tertiary Butyl Alcohol	UG/L	---	---	---	---	---	---	---	---	---
Tetrachloroethene	UG/L	---	---	---	---	---	---	---	---	---
Tetrahydrofuran	UG/L	---	---	---	---	---	---	---	---	---
Toluene	UG/L	< 0.500 U	< 0.500 U	< 0.500 U	1.13	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U
trans-1,2-Dichloroethene	UG/L	---	---	---	---	---	---	---	---	---
Trichloroethene	UG/L	---	---	---	---	---	---	---	---	---
Vinyl chloride	UG/L	---	---	---	---	---	---	---	---	---
Xylenes, total	UG/L	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U

Notes:
U : Parameter not detected at posted limit
< : Parameter not detected at posted limit
ND : Parameter not detected
H : Parameter analyzed beyond method recommended holding time
J : Estimated value
--- : Parameter not analyzed.
B : Blank qualified
ug/L : Micrograms per liter
mg/L : Milligrams per liter
NA : Not Available
NTU : Nephelometric Turbidity Unit
umho/cm : Micromhos per centimeter
colonies/100 ml : Colonies per 100 milliileters

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER H

Property Owner		PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H
Location Description		WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.
Source Type		WELL	WELL	WELL
Well Depth		340	340	340
Sampled Before Treatment?		Pre-Treatment	Pre-Treatment	Post-Treatment
Sample ID		1028201120204	1108201120208	1108201120209
Parameter and units	Sample Date	10/28/2011	11/8/2011	11/8/2011
Aldehydes				
Gluteraldehyde	UG/L	---	---	---
Bacteria				
E. coli	colonies/100ml	Absent	---	---
Fecal coliform bacteria	colonies/100ml	< 1 U	---	---
Total Coliform Bacteria	colonies/100ml	Present	---	---
DBCP				
1,2-Dibromo-3-chloropropane	UG/L	< 0.1017 U	---	---
Extractable Petroleum Hydrocarbons				
Diesel	UG/L	< 94.3 U	---	---
General Chemistry				
Alkalinity, Total (CaCO3)	MG/L	62.3	---	---
Ammonia as N	MG/L	< 0.100 U	---	---
Bicarbonate Alkalinity as CaCO3	MG/L	63.9	86.6	55
Bromide	MG/L	< 2.5 U	< 5.00 U	< 5.00 U
Carbonate as CaCO3	MG/L	< 10.0 U	< 10.0 U	< 10.0 U
Chloride	MG/L	9.8 J	< 5.00 U	< 5.00 U
CO2 by Headspace	UG/L	16000	---	---
Cyanide	MG/L	---	---	---
Fluoride	MG/L	< 0.50 U	---	---
MBAS	MG/L	< 0.12 U	< 0.0500 UH	< 0.0500 UH
Nitrate	MG/L	---	---	---
Nitrate Nitrogen	MG/L	0.52	---	---
Nitrite Nitrogen	MG/L	< 0.50 UJ	---	---
Oil & Grease HEM	MG/L	< 5.48 U	< 6.41 U	< 6.76 U
pH	pH UNITS	6.80 H	6.80 H	6.50 H
Phosphorus	MG/L	< 0.100 U	---	---
Specific conductance	UMHO/CM	162	177	141
Sulfate	MG/L	16.0 J	9.3	10.3
Temperature of pH determination	CELSIUS	22.0 H	21.0 H	21.0 H
Total Dissolved Solids	MG/L	67	111	88
Total Suspended Solids	MG/L	5.4	< 1.00 U	< 1.00 U
Turbidity	NTU	6.8	1.92 H	1.10 H
Glycols				
1,2-Propylene Glycol	MG/L	---	---	---
Diethylene Glycol	MG/L	< 10 U	---	---
Ethylene Glycol	MG/L	---	---	---
Tetraethylene glycol	MG/L	20 J	---	---
Triethylene glycol	MG/L	12 J	---	---
Light Gases				
Acetylene	MG/L	< 0.00500 U	---	---
Ethane	MG/L	< 0.00500 U	< 0.00500 U	< 0.00500 U
Ethene	MG/L	< 0.00500 U	---	---
Methane	MG/L	0.00607	0.0655	0.0258
n-Butane	MG/L	< 0.00500 U	---	---
Propane	MG/L	< 0.00500 U	< 0.00500 U	< 0.00500 U
Low Molecular Weight Acids				
Acetic Acid	UG/L	< 10000 U	---	---
Butyric Acid	UG/L	< 10000 U	---	---
Formic Acid	UG/L	< 10000 U	---	---
Isobutyric acid	UG/L	< 10000 U	---	---
Lactic acid	UG/L	< 5000 U	---	---
Propionic Acid	UG/L	< 13000 U	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER H

Property Owner		PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H
Location Description		WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.
Source Type		WELL	WELL	WELL
Well Depth		340	340	340
Sampled Before Treatment?		Pre-Treatment	Pre-Treatment	Post-Treatment
Sample ID		1028201120204	1108201120208	1108201120209
Parameter and units	Sample Date	10/28/2011	11/8/2011	11/8/2011
Metals, 6020x				
Cesium	MG/L	< 0.25 U	---	---
Cesium, Dissolved	MG/L	< 0.25 U	---	---
Potassium	MG/L	< 250 U	---	---
Potassium, Dissolved	MG/L	< 250 U	---	---
Silicon	MG/L	< 6250 U	---	---
Silicon, Dissolved	MG/L	< 6250 U	---	---
Thorium	MG/L	< 5 U	---	---
Thorium, Dissolved	MG/L	< 5 U	---	---
Uranium	MG/L	< 2.5 U	---	---
Uranium, Dissolved	MG/L	< 2.5 U	---	---
Metals, Total				
Aluminum	MG/L	0.322	---	---
Antimony	MG/L	< 0.00200 U	---	---
Arsenic	MG/L	< 0.00200 U	< 0.0100 U	< 0.0100 U
Barium	MG/L	0.213	0.19	0.21
Beryllium	MG/L	< 0.00200 U	---	---
Boron	MG/L	0.0556	---	---
Cadmium	MG/L	< 0.00100 U	< 0.00100 U	< 0.00100 U
Calcium	MG/L	16.3	12.2	15.4
Chromium	MG/L	< 0.00200 U	< 0.00500 U	< 0.00500 U
Cobalt	MG/L	< 0.00200 U	---	---
Copper	MG/L	0.0143	---	---
Hardness, CaCO3	MG/L	---	---	---
Iron	MG/L	0.267	0.0582	< 0.0500 U
Lead	MG/L	< 0.00200 U	< 0.00500 U	< 0.00500 U
Lithium	MG/L	---	---	---
Magnesium	MG/L	2.4	1.85	2.36
Manganese	MG/L	0.0216	< 0.0150 U	< 0.0150 U
Mercury	MG/L	< 0.000200 U	< 0.000200 U	< 0.000200 U
Molybdenum	MG/L	< 0.00500 U	---	---
Nickel	MG/L	< 0.00500 U	---	---
Potassium	MG/L	1.05	< 1.00 U	< 1.00 U
Selenium	MG/L	< 0.00200 U	< 0.0100 U	< 0.0100 U
Silver	MG/L	< 0.00200 U	< 0.00500 U	< 0.00500 U
Sodium	MG/L	13.5	25.8	9.2
Strontium	MG/L	0.212	0.173	0.204
Sulfur	MG/L	4.07	3.6	4.04
Thallium	MG/L	< 0.00200 U	---	---
Titanium	MG/L	0.00602	---	---
Vanadium	MG/L	< 0.00400 U	---	---
Zinc	MG/L	< 0.0500 U	---	---
Metals, Dissolved				
Aluminum, Dissolved	MG/L	< 0.0200 U	---	---
Antimony, Dissolved	MG/L	< 0.00200 U	---	---
Arsenic, Dissolved	MG/L	< 0.00200 U	---	---
Barium, Dissolved	MG/L	0.195	---	---
Beryllium, Dissolved	MG/L	< 0.00200 U	---	---
Boron, Dissolved	MG/L	< 0.0500 U	---	---
Cadmium, Dissolved	MG/L	< 0.00100 U	---	---
Calcium, Dissolved	MG/L	15.7	---	---
Chromium, Dissolved	MG/L	< 0.00200 U	---	---
Cobalt, Dissolved	MG/L	< 0.00200 U	---	---
Copper, Dissolved	MG/L	0.0102	---	---
Iron, Dissolved	MG/L	< 0.0500 U	---	---
Lead, Dissolved	MG/L	< 0.00200 U	---	---
Magnesium, Dissolved	MG/L	2.26	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER H

Property Owner		PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H
Location Description		WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.
Source Type		WELL	WELL	WELL
Well Depth		340	340	340
Sampled Before Treatment?		Pre-Treatment	Pre-Treatment	Post-Treatment
Sample ID		1028201120204	1108201120208	1108201120209
Parameter and units	Sample Date	10/28/2011	11/8/2011	11/8/2011
Manganese, Dissolved	MG/L	< 0.00500 U	---	---
Mercury, Dissolved	MG/L	< 0.000200 U	---	---
Molybdenum, Dissolved	MG/L	< 0.00500 U	---	---
Nickel, Dissolved	MG/L	< 0.00500 U	---	---
Potassium, Dissolved	MG/L	< 1.00 U	---	---
Selenium, Dissolved	MG/L	< 0.00200 U	---	---
Silver, Dissolved	MG/L	< 0.00200 U	---	---
Sodium, Dissolved	MG/L	12.6	---	---
Strontium, Dissolved	MG/L	0.203	---	---
Sulfur, Dissolved	MG/L	3.81	---	---
Thallium, Dissolved	MG/L	< 0.00200 U	---	---
Titanium, Dissolved	MG/L	< 0.00200 U	---	---
Vanadium, Dissolved	MG/L	< 0.00400 U	---	---
Zinc, Dissolved	MG/L	< 0.0500 U	---	---
Miscellaneous Organics				
Inorganic Carbon, Dissolved	MG/L	17.1	---	---
Organic Carbon, Dissolved	MG/L	< 1.00 U	---	---
Pesticides and PCBs				
4,4'-DDD	UG/L	< 0.0236 U	---	---
4,4'-DDE	UG/L	< 0.0236 U	---	---
4,4'-DDT	UG/L	< 0.0236 U	---	---
Aldrin	UG/L	< 0.0236 U		
alpha-BHC	UG/L	< 0.0236 U	---	---
Azinphos-methyl	UG/L	< 0.94 U	---	---
beta-BHC	UG/L	< 0.0236 U	---	---
Carbaryl	UG/L	< 6.0 U	---	---
delta-BHC	UG/L	< 0.0236 U	---	---
Dichlorvos	UG/L	< 0.94 U	---	---
Dieldrin	UG/L	< 0.0236 U	---	---
Disulfoton	UG/L	< 0.94 U	---	---
Endosulfan I	UG/L	< 0.0236 U	---	---
Endosulfan II	UG/L	< 0.0236 U	---	---
Endosulfan sulfate	UG/L	< 0.0236 U	---	---
Endrin	UG/L	< 0.0236 U	---	---
Endrin aldehyde	UG/L	< 0.0236 U	---	---
Endrin ketone	UG/L	< 0.0236 U	---	---
gamma-BHC (Lindane)	UG/L	< 0.0236 U	---	---
Heptachlor	UG/L	< 0.0236 U	---	---
Heptachlor epoxide	UG/L	< 0.0236 U	---	---
Malathion	UG/L	< 0.94 U	---	---
Methoxychlor	UG/L	< 0.0236 U	---	---
Mevinphos	UG/L	< 0.94 U	---	---
Purgeable Petroleum Hydrocarbons				
GRO as Gasoline	UG/L	< 100 U	---	---
Semivolatile Organics				
1,2,4,5-Tetrachlorobenzene	UG/L	< 1 U	---	---
1,2-Dinitrobenzene	UG/L	< 5 U	---	---
1,2-Diphenylhydrazine	UG/L	< 1 U	---	---
1,3-Dimethyl adamatane	UG/L	< 5 U	---	---
1,3-Dinitrobenzene	UG/L	< 5 U	---	---
1,4-Dinitrobenzene	UG/L	< 5 U	---	---
1-Chloronaphthalene	UG/L	< 1 U	---	---
2,3,4,6-Tetrachlorophenol	UG/L	< 1 U	---	---
2,4,5-Trichlorophenol	UG/L	< 1 U	---	---
2,4,6-Trichlorophenol	UG/L	< 1 U	---	---
2,4-Dichlorophenol	UG/L	< 1 U	---	---
2,4-Dimethylphenol	UG/L	< 1 U	---	---
2,4-Dinitrophenol	UG/L	< 29 U	---	---
2,4-Dinitrotoluene	UG/L	< 5 U	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER H

Property Owner		PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H
Location Description		WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.
Source Type		WELL	WELL	WELL
Well Depth		340	340	340
Sampled Before Treatment?		Pre-Treatment	Pre-Treatment	Post-Treatment
Sample ID		1028201120204	1108201120208	1108201120209
Parameter and units	Sample Date	10/28/2011	11/8/2011	11/8/2011
2,6-Dichlorophenol	UG/L	< 1 U	---	---
2,6-Dinitrotoluene	UG/L	< 1 U	---	---
2-Butoxyethanol	UG/L	< 5 UJ	---	---
2-Chloronaphthalene	UG/L	< 1 U	---	---
2-Chlorophenol	UG/L	< 1 U	---	---
2-Methylnaphthalene	UG/L	< 0.5 U	---	---
2-Methylphenol	UG/L	< 1 U	---	---
2-Nitroaniline	UG/L	< 1 U	---	---
2-Nitrophenol	UG/L	< 1 U	---	---
3,3-Dichlorobenzidine	UG/L	< 5 U	---	---
3-Nitroaniline	UG/L	< 1 U	---	---
4,4'-Methylenebis(2-chloroaniline)	UG/L	< 14 U	---	---
4,4'-Methylenebis(N,N-dimethylanilir	UG/L	< 14 UJ	---	---
4,6-Dinitro-2-methylphenol	UG/L	< 14 U	---	---
4-Bromophenyl phenyl ether	UG/L	< 1 U	---	---
4-Chloro-3-methylphenol	UG/L	< 1 U	---	---
4-Chloroaniline	UG/L	< 1 U	---	---
4-Chlorophenyl phenyl ether	UG/L	< 1 U	---	---
4-Methylphenol	UG/L	< 1 U	---	---
4-Nitroaniline	UG/L	< 1 UJ	---	---
4-Nitrophenol	UG/L	< 29 U	---	---
Acenaphthene	UG/L	< 0.5 U	---	---
Acenaphthylene	UG/L	< 0.5 U	---	---
Acetophenone	UG/L	< 1 U	---	---
Adamantane	UG/L	< 5 U	---	---
Aniline	UG/L	< 1 U	---	---
Anthracene	UG/L	< 0.5 U	---	---
Benzo (a) anthracene	UG/L	< 0.5 U	---	---
Benzo (a) pyrene	UG/L	< 0.5 U	---	---
Benzo (b) fluoranthene	UG/L	< 0.5 U	---	---
Benzo (g,h,i) perylene	UG/L	< 0.5 U	---	---
Benzo (k) fluoranthene	UG/L	< 0.5 U	---	---
Benzoic acid	UG/L	< 14 U	---	---
Benzyl alcohol	UG/L	< 14 U	---	---
Bis(2-chloroethoxy)methane	UG/L	< 1 U	---	---
Bis(2-chloroethyl)ether	UG/L	< 1 U	---	---
bis(2-Chloroisopropyl)ether	UG/L	< 1 U	---	---
Bis(2-ethylhexyl)phthalate	UG/L	< 5 U	---	---
Butyl benzyl phthalate	UG/L	< 5 U	---	---
Carbazole	UG/L	< 1 U	---	---
Chlorobenzilate	UG/L	< 10 U	---	---
Chrysene	UG/L	< 0.5 U	---	---
Diallate (cis or trans)	UG/L	< 5 U	---	---
Dibenz (a,h) anthracene	UG/L	< 0.5 U	---	---
Dibenzofuran	UG/L	< 1 U	---	---
Diethyl phthalate	UG/L	< 5 U	---	---
Dimethyl phthalate	UG/L	< 5 U	---	---
Di-n-butyl phthalate	UG/L	< 5 U	---	---
Di-n-octyl phthalate	UG/L	< 5 U	---	---
Dinoseb	UG/L	< 5 U	---	---
Disulfoton	UG/L	< 48 U	---	---
d-Limonene	UG/L	< 5 U	---	---
Fluoranthene	UG/L	< 0.5 U	---	---
Fluorene	UG/L	< 0.5 U	---	---
Hexachlorobenzene	UG/L	< 0.5 U	---	---
Hexachlorobutadiene	UG/L	< 1 U	---	---
Hexachlorocyclopentadiene	UG/L	< 14 U	---	---
Hexachloroethane	UG/L	< 5 U	---	---
Indeno (1,2,3-cd) pyrene	UG/L	< 0.5 U	---	---
Isophorone	UG/L	< 1 U	---	---
Naphthalene	UG/L	< 0.5 U	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER H

Property Owner		PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H
Location Description		WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.
Source Type		WELL	WELL	WELL
Well Depth		340	340	340
Sampled Before Treatment?		Pre-Treatment	Pre-Treatment	Post-Treatment
Sample ID		1028201120204	1108201120208	1108201120209
Parameter and units	Sample Date	10/28/2011	11/8/2011	11/8/2011
Nitrobenzene	UG/L	< 1 U	---	---
N-Nitrosodiethylamine	UG/L	< 1 U	---	---
N-Nitrosodimethylamine	UG/L	< 5 U	---	---
N-Nitrosodi-n-butylamine	UG/L	< 5 U	---	---
N-Nitrosodi-n-propylamine	UG/L	< 1 U	---	---
N-Nitrosodiphenylamine	UG/L	< 1 U	---	---
N-Nitrosomethylethylamine	UG/L	< 5 U	---	---
Parathion-ethyl	UG/L	< 5 U	---	---
Parathion-methyl	UG/L	< 5 U	---	---
Pentachlorobenzene	UG/L	< 1 U	---	---
Pentachlorophenol	UG/L	< 5 UJ	---	---
Phenanthrene	UG/L	< 0.5 U	---	---
Phenol	UG/L	< 1 U	---	---
Phorate	UG/L	< 1 U	---	---
Pronamide	UG/L	< 1 U	---	---
Pyrene	UG/L	< 0.5 U	---	---
Pyridine	UG/L	< 5 U	---	---
Squalene	UG/L	< 5 UJ	---	---
Terbufos	UG/L	< 5 U	---	---
Terpineol	UG/L	< 5 U	---	---
Tributoxyethyl phosphate	UG/L	< 5 UJ	---	---
Trifluralin	UG/L	< 5 U	---	---
TICs				
1,2,3-Trimethylbenzene	UG/L	---	---	---
Volatile Organics				
1,1,1-Trichloroethane	UG/L	< 1.00 U	---	---
1,1,2-Trichloroethane	UG/L	< 1.00 U	---	---
1,1-Dichloroethane	UG/L	< 1.00 U	---	---
1,1-Dichloroethene	UG/L	< 1.00 U	---	---
1,2,3-Trimethylbenzene	UG/L	< 1.00 U	---	---
1,2,4-Trichlorobenzene	UG/L	---	---	---
1,2,4-Trimethylbenzene	UG/L	< 1.00 U	---	---
1,2-Dibromo-3-chloropropane	UG/L	< 0.1017 U	---	---
1,2-Dichlorobenzene	UG/L	< 1.00 U	---	---
1,2-Dichloroethane	UG/L	< 1.00 U	---	---
1,2-Dichloropropane	UG/L	---	---	---
1,3,5-Trimethylbenzene	UG/L	< 1.00 U	---	---
1,3-Dichlorobenzene	UG/L	< 1.00 U	---	---
1,4-Dichlorobenzene	UG/L	< 1.00 U	---	---
Acetone	UG/L	< 50.0 U	---	---
Benzene	UG/L	< 1.00 U	< 0.500 U	< 0.500 U
Carbon disulfide	UG/L	< 1.00 U	---	---
Carbon Tetrachloride	UG/L	< 1.00 U	---	---
Chlorobenzene	UG/L	< 1.00 U	---	---
Chloroform	UG/L	< 1.00 U	---	---
cis-1,2-Dichloroethene	UG/L	< 1.00 U	---	---
Diisopropyl Ether	UG/L	< 1.00 U	---	---
Ethanol	UG/L	< 100 U	---	---
Ethyl tert-Butyl Ether	UG/L	< 1.00 U	---	---
Ethylbenzene	UG/L	< 1.00 U	< 0.500 U	< 0.500 U
Hexachlorobutadiene	UG/L	< 1 U	---	---
Isopropyl alcohol	UG/L	< 50.0 U	---	---
Isopropylbenzene	UG/L	< 1.00 U	---	---
m,p-Xylene	UG/L	< 2.00 U	---	---
Methoxychlor	UG/L	< 0.0236 U	---	---
Methyl tert-Butyl Ether	UG/L	< 1.00 U	---	---
Methylene Chloride	UG/L	< 5.00 U	---	---
Naphthalene	UG/L	< 5.00 U	---	---
o-Xylene	UG/L	< 1.00 U	---	---
Styrene	UG/L	---	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER H

Property Owner		PROPERTY OWNER H	PROPERTY OWNER H	PROPERTY OWNER H
Location Description		WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.	WELL IS LOCATED TO THE SOUTH OF THE RESIDENCE.
Source Type		WELL	WELL	WELL
Well Depth		340	340	340
Sampled Before Treatment?		Pre-Treatment	Pre-Treatment	Post-Treatment
Sample ID		1028201120204	1108201120208	1108201120209
Parameter and units	Sample Date	10/28/2011	11/8/2011	11/8/2011
Tert-Amyl Methyl Ether	UG/L	< 1.00 U	---	---
Tertiary Butyl Alcohol	UG/L	< 10.0 U	---	---
Tetrachloroethene	UG/L	< 1.00 U	---	---
Tetrahydrofuran	UG/L	---	---	---
Toluene	UG/L	< 1.00 U	< 0.500 U	< 0.500 U
trans-1,2-Dichloroethene	UG/L	< 1.00 U	---	---
Trichloroethene	UG/L	< 1.00 U	---	---
Vinyl chloride	UG/L	< 1.00 U	---	---
Xylenes, total	UG/L	< 3.00 U	< 0.500 U	< 0.500 U

Notes:
U : Parameter not detected at posted limit
< : Parameter not detected at posted limit
ND : Parameter not detected
H : Parameter analyzed beyond method recommended holding time
J : Estimated value
--- : Parameter not analyzed.
B : Blank qualified
ug/L : Micrograms per liter
mg/L : Milligrams per liter
NA : Not Available
NTU : Nephelometric Turbidity Unit
umho/cm : Micromhos per centimeter
colonies/100 ml : Colonies per 100 millileters

APPENDIX A-9
EPA STUDY WELL DATA
PROPERTY OWNER I

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER I

Property Owner		PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I
Location Description		OLD WELL	OLD WELL	OLD WELL	OLD WELL	OLD WELL	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		142	142	142	142	142	203	203	203	203
Sampled Before Treatment?		Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	NA	NA	NA	NA	Pre-Treatment
Sample ID		NTH0172-08032010-1100	0915201000103	1006201000902	1020201000102	1031201120202	0914201000105	1006201000901	1013201000901	1013201000902
Parameter and units	Sample Date	8/3/2010	9/15/2010	10/6/2010	10/20/2010	10/31/2011	9/14/2010 (Baseline)	10/6/2010	10/13/2010	10/13/2010
Aldehydes										
Gluteraldehyde	UG/L	---	---	---	---	---	---	---	---	---
Bacteria										
E. coli	colonies/100ml	---	---	---	---	Absent	---	---	---	---
Fecal coliform bacteria	colonies/100ml	---	---	---	---	< 1 U	---	---	---	---
Total Coliform Bacteria	colonies/100ml	---	---	---	---	Present	---	---	---	---
DBCP										
1,2-Dibromo-3-chloropropane	UG/L	---	---	---	---	< 0.1017 U	---	---	---	---
Extractable Petroleum Hydrocarbons										
Diesel	UG/L	---	---	---	---	< 94.3 U	---	---	---	---
General Chemistry										
Alkalinity, Total (CaCO3)	MG/L	---	---	---	---	67.4	---	---	---	---
Ammonia as N	MG/L	---	---	---	---	< 0.100 U	---	---	---	---
Bicarbonate Alkalinity as CaCO3	MG/L	121	68.5	---	---	69.5	113	---	---	---
Bromide	MG/L	---	---	---	---	< 2.5 UJ	---	---	---	---
Carbonate as CaCO3	MG/L	< 10.0 U	< 10.0 U	---	---	< 10.0 U	< 10.0 U	---	---	---
Chloride	MG/L	44.3	57.3	---	---	26.2 J	28.8	---	---	---
CO2 by Headspace	UG/L	---	---	---	---	20000	---	---	---	---
Cyanide	MG/L	---	---	---	---	---	---	---	---	---
Fluoride	MG/L	---	---	---	---	< 0.50 UJ	---	---	---	---
MBAS	MG/L	< 0.0500 U	< 0.0500 U	---	---	< 0.12 U	< 0.0500 U	---	---	---
Nitrate	MG/L	---	---	---	---	---	---	---	---	---
Nitrate Nitrogen	MG/L	---	---	---	---	0.75	---	---	---	---
Nitrite Nitrogen	MG/L	---	---	---	---	< 0.50 UJ	---	---	---	---
Oil & Grease HEM	MG/L	< 5.43 U	< 5.81 U	---	---	< 4.60 U	< 5.95 U	---	---	---
pH	pH UNITS	6.40 J	6.70 J	---	---	6.40 H	7.60 J	---	---	---
Phosphorus	MG/L	---	---	---	---	< 0.100 U	---	---	---	---
Specific conductance	UMHO/CM	340	398	---	---	265	327	---	---	---
Sulfate	MG/L	16.6	18	---	---	26.3 J	13.4	---	---	---
Temperature of pH determination	CELSIUS	22.0 J	23.0 J	---	---	21.6 H	23.1 J	---	---	---
Total Dissolved Solids	MG/L	214	264	---	---	156	166	---	---	---
Total Suspended Solids	MG/L	< 1.00 U	< 1.00 U	---	---	< 1.00 U	41.2	---	---	---
Turbidity	NTU	< 1.00 U	3.8	---	---	< 0.30 U	68	---	---	---
Glycols										
1,2-Propylene Glycol	MG/L	---	---	---	---	---	---	---	---	---
Diethylene Glycol	MG/L	---	---	---	---	< 10 U	---	---	---	---
Ethylene Glycol	MG/L	---	---	---	---	---	---	---	---	---
Tetraethylene glycol	MG/L	---	---	---	---	< 10 UJ	---	---	---	---
Triethylene glycol	MG/L	---	---	---	---	< 10 U	---	---	---	---
Light Gases										
Acetylene	MG/L	---	---	---	---	< 0.00500 U	---	---	---	---
Ethane	MG/L	< 0.0260 U	0.0953	0.195	0.103	< 0.00500 U	1.59	1.84	1.47	0.254
Ethene	MG/L	---	---	---	---	< 0.00500 U	---	---	---	---
Methane	MG/L	0.0957	1.41	2.78 J	1.78	< 0.00500 U	10.9	25.4	20.6	4.58
n-Butane	MG/L	---	---	---	---	< 0.00500 U	---	---	---	---
Propane	MG/L	< 0.0340 U	< 0.0340 U	< 0.0340 U	< 0.0340 U	< 0.00500 U	0.101	0.117	0.0841	< 0.0340 U
Low Molecular Weight Acids										
Acetic Acid	UG/L	---	---	---	---	< 10000 U	---	---	---	---
Butyric Acid	UG/L	---	---	---	---	< 10000 U	---	---	---	---
Formic Acid	UG/L	---	---	---	---	< 10000 U	---	---	---	---
Isobutyric acid	UG/L	---	---	---	---	< 10000 U	---	---	---	---
Lactic acid	UG/L	---	---	---	---	< 5000 U	---	---	---	---
Propionic Acid	UG/L	---	---	---	---	< 13000 U	---	---	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER I

Property Owner		PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I
Location Description		OLD WELL	OLD WELL	OLD WELL	OLD WELL	OLD WELL	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		142	142	142	142	142	203	203	203	203
Sampled Before Treatment?		Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	NA	NA	NA	NA	Pre-Treatment
Sample ID		NTH0172-08032010-1100	0915201000103	1006201000902	1020201000102	1031201120202	0914201000105	1006201000901	1013201000901	1013201000902
Parameter and units	Sample Date	8/3/2010	9/15/2010	10/6/2010	10/20/2010	10/31/2011	9/14/2010 (Baseline)	10/6/2010	10/13/2010	10/13/2010
Metals, 6020x										
Cesium	MG/L	---	---	---	---	< 0.1 U	---	---	---	---
Cesium, Dissolved	MG/L	---	---	---	---	< 0.1 U	---	---	---	---
Potassium	MG/L	---	---	---	---	< 100 U	---	---	---	---
Potassium, Dissolved	MG/L	---	---	---	---	< 100 U	---	---	---	---
Silicon	MG/L	---	---	---	---	< 2500 U	---	---	---	---
Silicon, Dissolved	MG/L	---	---	---	---	< 2500 U	---	---	---	---
Thorium	MG/L	---	---	---	---	< 2 U	---	---	---	---
Thorium, Dissolved	MG/L	---	---	---	---	< 2 U	---	---	---	---
Uranium	MG/L	---	---	---	---	< 1 U	---	---	---	---
Uranium, Dissolved	MG/L	---	---	---	---	< 1 U	---	---	---	---
Metals, Total										
Aluminum	MG/L	---	---	---	---	< 0.0200 U	---	---	---	---
Antimony	MG/L	---	---	---	---	< 0.00200 U	---	---	---	---
Arsenic	MG/L	< 0.0100 U	< 0.0100 U	---	---	< 0.00200 U	< 0.0100 U	---	---	---
Barium	MG/L	0.116	0.136	---	---	0.0856	0.297	---	---	---
Beryllium	MG/L	---	---	---	---	< 0.00200 U	---	---	---	---
Boron	MG/L	---	---	---	---	< 0.0500 U	---	---	---	---
Cadmium	MG/L	< 0.00100 U	< 0.00100 U	---	---	< 0.00100 U	< 0.00100 U	---	---	---
Calcium	MG/L	44.1	51.6	---	---	35.4	41	---	---	---
Chromium	MG/L	< 0.00500 U	< 0.00500 U	---	---	< 0.00200 U	< 0.00500 U	---	---	---
Cobalt	MG/L	---	---	---	---	< 0.00200 U	---	---	---	---
Copper	MG/L	---	---	---	---	< 0.00500 U	---	---	---	---
Hardness, CaCO3	MG/L	---	---	---	---	---	---	---	---	---
Iron	MG/L	< 0.0500 U	0.0537	---	---	< 0.0500 U	2.29 J	---	---	---
Lead	MG/L	< 0.00500 U	< 0.00500 U	---	---	< 0.00200 U	< 0.00500 U	---	---	---
Lithium	MG/L	---	---	---	---	---	---	---	---	---
Magnesium	MG/L	6.1	7.17	---	---	4.95	6.43	---	---	---
Manganese	MG/L	< 0.0150 U	< 0.0150 U	---	---	< 0.00500 U	0.0429	---	---	---
Mercury	MG/L	< 0.000200 U	< 0.000200 U	---	---	< 0.000200 U	< 0.000200 U	---	---	---
Molybdenum	MG/L	---	---	---	---	< 0.00500 U	---	---	---	---
Nickel	MG/L	---	---	---	---	< 0.00500 U	---	---	---	---
Potassium	MG/L	< 1.00 U	1.05	---	---	< 1.00 U	2.48	---	---	---
Selenium	MG/L	< 0.0100 U	< 0.0100 U	---	---	< 0.00200 U	< 0.0100 U	---	---	---
Silver	MG/L	< 0.00500 U	< 0.00500 U	---	---	< 0.00200 U	< 0.00500 U	---	---	---
Sodium	MG/L	12.2	14.8	---	---	7.68	14.6	---	---	---
Strontium	MG/L	---	---	---	---	0.0576	---	---	---	---
Sulfur	MG/L	5.3	5.5	---	---	4.68	3.7	---	---	---
Thallium	MG/L	---	---	---	---	< 0.00200 U	---	---	---	---
Titanium	MG/L	---	---	---	---	< 0.00200 U	---	---	---	---
Vanadium	MG/L	---	---	---	---	< 0.00400 U	---	---	---	---
Zinc	MG/L	---	---	---	---	< 0.0500 U	---	---	---	---
Metals, Dissolved										
Aluminum, Dissolved	MG/L	---	---	---	---	< 0.0200 U	---	---	---	---
Antimony, Dissolved	MG/L	---	---	---	---	< 0.00200 U	---	---	---	---
Arsenic, Dissolved	MG/L	---	---	---	---	< 0.00200 U	< 0.0100 U	---	---	---
Barium, Dissolved	MG/L	---	---	---	---	0.0868	0.256	---	---	---
Beryllium, Dissolved	MG/L	---	---	---	---	< 0.00200 U	---	---	---	---
Boron, Dissolved	MG/L	---	---	---	---	< 0.0500 U	---	---	---	---
Cadmium, Dissolved	MG/L	---	---	---	---	< 0.00100 U	< 0.00100 U	---	---	---
Calcium, Dissolved	MG/L	---	---	---	---	34.6	41.6	---	---	---
Chromium, Dissolved	MG/L	---	---	---	---	< 0.00200 U	< 0.00500 U	---	---	---
Cobalt, Dissolved	MG/L	---	---	---	---	< 0.00200 U	---	---	---	---
Copper, Dissolved	MG/L	---	---	---	---	< 0.00500 U	---	---	---	---
Iron, Dissolved	MG/L	---	---	---	---	< 0.0500 U	< 0.0500 U	---	---	---
Lead, Dissolved	MG/L	---	---	---	---	< 0.00200 U	< 0.00500 U	---	---	---
Magnesium, Dissolved	MG/L	---	---	---	---	4.91	6.25	---	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER I

Property Owner		PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I
Location Description		OLD WELL	OLD WELL	OLD WELL	OLD WELL	OLD WELL	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		142	142	142	142	142	203	203	203	203
Sampled Before Treatment?		Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	NA	NA	NA	NA	Pre-Treatment
Sample ID		NTH0172-08032010-1100	0915201000103	1006201000902	1020201000102	1031201120202	0914201000105	1006201000901	1013201000901	1013201000902
Parameter and units	Sample Date	8/3/2010	9/15/2010	10/6/2010	10/20/2010	10/31/2011	9/14/2010 (Baseline)	10/6/2010	10/13/2010	10/13/2010
Manganese, Dissolved	MG/L	---	---	---	---	< 0.00500 U	0.0214	---	---	---
Mercury, Dissolved	MG/L	---	---	---	---	< 0.000200 U	< 0.000200 U	---	---	---
Molybdenum, Dissolved	MG/L	---	---	---	---	< 0.00500 U	---	---	---	---
Nickel, Dissolved	MG/L	---	---	---	---	< 0.00500 U	---	---	---	---
Potassium, Dissolved	MG/L	---	---	---	---	< 1.00 U	1.68	---	---	---
Selenium, Dissolved	MG/L	---	---	---	---	< 0.00200 U	< 0.0100 U	---	---	---
Silver, Dissolved	MG/L	---	---	---	---	< 0.00200 U	< 0.00500 U	---	---	---
Sodium, Dissolved	MG/L	---	---	---	---	7.4	15.1	---	---	---
Strontium, Dissolved	MG/L	---	---	---	---	0.0567	---	---	---	---
Sulfur, Dissolved	MG/L	---	---	---	---	4.47	---	---	---	---
Thallium, Dissolved	MG/L	---	---	---	---	< 0.00200 U	---	---	---	---
Titanium, Dissolved	MG/L	---	---	---	---	< 0.00200 U	---	---	---	---
Vanadium, Dissolved	MG/L	---	---	---	---	< 0.00400 U	---	---	---	---
Zinc, Dissolved	MG/L	---	---	---	---	< 0.0500 U	---	---	---	---
Miscellaneous Organics										
Inorganic Carbon, Dissolved	MG/L	---	---	---	---	19	---	---	---	---
Organic Carbon, Dissolved	MG/L	---	---	---	---	< 1.00 U	---	---	---	---
Pesticides and PCBs										
4,4'-DDD	UG/L	---	---	---	---	< 0.0236 U	---	---	---	---
4,4'-DDE	UG/L	---	---	---	---	< 0.0236 U	---	---	---	---
4,4'-DDT	UG/L	---	---	---	---	< 0.0236 U	---	---	---	---
Aldrin	UG/L	---	---	---	---	< 0.0236 U	---	---	---	---
alpha-BHC	UG/L	---	---	---	---	< 0.0236 U	---	---	---	---
Azinphos-methyl	UG/L	---	---	---	---	< 0.94 U	---	---	---	---
beta-BHC	UG/L	---	---	---	---	< 0.0236 U	---	---	---	---
Carbaryl	UG/L	---	---	---	---	< 6.0 U	---	---	---	---
delta-BHC	UG/L	---	---	---	---	< 0.0236 U	---	---	---	---
Dichlorvos	UG/L	---	---	---	---	< 0.94 U	---	---	---	---
Dieldrin	UG/L	---	---	---	---	< 0.0236 U	---	---	---	---
Disulfoton	UG/L	---	---	---	---	< 0.94 U	---	---	---	---
Endosulfan I	UG/L	---	---	---	---	< 0.0236 U	---	---	---	---
Endosulfan II	UG/L	---	---	---	---	< 0.0236 U	---	---	---	---
Endosulfan sulfate	UG/L	---	---	---	---	< 0.0236 U	---	---	---	---
Endrin	UG/L	---	---	---	---	< 0.0236 U	---	---	---	---
Endrin aldehyde	UG/L	---	---	---	---	< 0.0236 U	---	---	---	---
Endrin ketone	UG/L	---	---	---	---	< 0.0236 U	---	---	---	---
gamma-BHC (Lindane)	UG/L	---	---	---	---	< 0.0236 U	---	---	---	---
Heptachlor	UG/L	---	---	---	---	< 0.0236 U	---	---	---	---
Heptachlor epoxide	UG/L	---	---	---	---	< 0.0236 U	---	---	---	---
Malathion	UG/L	---	---	---	---	< 0.94 U	---	---	---	---
Methoxychlor	UG/L	---	---	---	---	< 0.0236 U	---	---	---	---
Mevinphos	UG/L	---	---	---	---	< 0.94 U	---	---	---	---
Purgeable Petroleum Hydrocarbons										
GRO as Gasoline	UG/L	---	---	---	---	< 100 U	---	---	---	---
Semivolatile Organics										
1,2,4,5-Tetrachlorobenzene	UG/L	---	---	---	---	< 1 U	---	---	---	---
1,2-Dinitrobenzene	UG/L	---	---	---	---	< 5 U	---	---	---	---
1,2-Diphenylhydrazine	UG/L	---	---	---	---	< 1 U	---	---	---	---
1,3-Dimethyl adamatane	UG/L	---	---	---	---	< 5 U	---	---	---	---
1,3-Dinitrobenzene	UG/L	---	---	---	---	< 5 U	---	---	---	---
1,4-Dinitrobenzene	UG/L	---	---	---	---	< 5 U	---	---	---	---
1-Chloronaphthalene	UG/L	---	---	---	---	< 1 U	---	---	---	---
2,3,4,6-Tetrachlorophenol	UG/L	---	---	---	---	< 1 U	---	---	---	---
2,4,5-Trichlorophenol	UG/L	---	---	---	---	< 1 U	---	---	---	---
2,4,6-Trichlorophenol	UG/L	---	---	---	---	< 1 U	---	---	---	---
2,4-Dichlorophenol	UG/L	---	---	---	---	< 1 U	---	---	---	---
2,4-Dimethylphenol	UG/L	---	---	---	---	< 1 U	---	---	---	---
2,4-Dinitrophenol	UG/L	---	---	---	---	< 29 U	---	---	---	---
2,4-Dinitrotoluene	UG/L	---	---	---	---	< 5 U	---	---	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER I

Property Owner		PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I
Location Description		OLD WELL	OLD WELL	OLD WELL	OLD WELL	OLD WELL	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		142	142	142	142	142	203	203	203	203
Sampled Before Treatment?		Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	NA	NA	NA	NA	Pre-Treatment
Sample ID		NTH0172-08032010-1100	0915201000103	1006201000902	1020201000102	1031201120202	0914201000105	1006201000901	1013201000901	1013201000902
Parameter and units	Sample Date	8/3/2010	9/15/2010	10/6/2010	10/20/2010	10/31/2011	9/14/2010 (Baseline)	10/6/2010	10/13/2010	10/13/2010
2,6-Dichlorophenol	UG/L	---	---	---	---	< 1 U	---	---	---	---
2,6-Dinitrotoluene	UG/L	---	---	---	---	< 1 U	---	---	---	---
2-Butoxyethanol	UG/L	---	---	---	---	< 5 UJ	---	---	---	---
2-Chloronaphthalene	UG/L	---	---	---	---	< 1 U	---	---	---	---
2-Chlorophenol	UG/L	---	---	---	---	< 1 U	---	---	---	---
2-Methylnaphthalene	UG/L	---	---	---	---	< 0.5 U	---	---	---	---
2-Methylphenol	UG/L	---	---	---	---	< 1 U	---	---	---	---
2-Nitroaniline	UG/L	---	---	---	---	< 1 U	---	---	---	---
2-Nitrophenol	UG/L	---	---	---	---	< 1 U	---	---	---	---
3,3-Dichlorobenzidine	UG/L	---	---	---	---	< 5 U	---	---	---	---
3-Nitroaniline	UG/L	---	---	---	---	< 1 U	---	---	---	---
4,4'-Methylenebis(2-chloroaniline)	UG/L	---	---	---	---	< 14 U	---	---	---	---
4,4'-Methylenebis(N,N-dimethylanilin	UG/L	---	---	---	---	< 14 UJ	---	---	---	---
4,6-Dinitro-2-methylphenol	UG/L	---	---	---	---	< 14 U	---	---	---	---
4-Bromophenyl phenyl ether	UG/L	---	---	---	---	< 1 U	---	---	---	---
4-Chloro-3-methylphenol	UG/L	---	---	---	---	< 1 U	---	---	---	---
4-Chloroaniline	UG/L	---	---	---	---	< 1 U	---	---	---	---
4-Chlorophenyl phenyl ether	UG/L	---	---	---	---	< 1 U	---	---	---	---
4-Methylphenol	UG/L	---	---	---	---	< 1 U	---	---	---	---
4-Nitroaniline	UG/L	---	---	---	---	< 1 UJ	---	---	---	---
4-Nitrophenol	UG/L	---	---	---	---	< 29 U	---	---	---	---
Acenaphthene	UG/L	---	---	---	---	< 0.5 U	---	---	---	---
Acenaphthylene	UG/L	---	---	---	---	< 0.5 U	---	---	---	---
Acetophenone	UG/L	---	---	---	---	< 1 U	---	---	---	---
Adamantane	UG/L	---	---	---	---	< 5 U	---	---	---	---
Aniline	UG/L	---	---	---	---	< 1 U	---	---	---	---
Anthracene	UG/L	---	---	---	---	< 0.5 U	---	---	---	---
Benzo (a) anthracene	UG/L	---	---	---	---	< 0.5 U	---	---	---	---
Benzo (a) pyrene	UG/L	---	---	---	---	< 0.5 U	---	---	---	---
Benzo (b) fluoranthene	UG/L	---	---	---	---	< 0.5 U	---	---	---	---
Benzo (g,h,i) perylene	UG/L	---	---	---	---	< 0.5 U	---	---	---	---
Benzo (k) fluoranthene	UG/L	---	---	---	---	< 0.5 U	---	---	---	---
Benzoic acid	UG/L	---	---	---	---	< 14 U	---	---	---	---
Benzyl alcohol	UG/L	---	---	---	---	< 14 U	---	---	---	---
Bis(2-chloroethoxy)methane	UG/L	---	---	---	---	< 1 U	---	---	---	---
Bis(2-chloroethyl)ether	UG/L	---	---	---	---	< 1 U	---	---	---	---
bis(2-Chloroisopropyl)ether	UG/L	---	---	---	---	< 1 U	---	---	---	---
Bis(2-ethylhexyl)phthalate	UG/L	---	---	---	---	< 5 U	---	---	---	---
Butyl benzyl phthalate	UG/L	---	---	---	---	< 5 U	---	---	---	---
Carbazole	UG/L	---	---	---	---	< 1 U	---	---	---	---
Chlorobenzilate	UG/L	---	---	---	---	< 10 U	---	---	---	---
Chrysene	UG/L	---	---	---	---	< 0.5 U	---	---	---	---
Diallate (cis or trans)	UG/L	---	---	---	---	< 5 U	---	---	---	---
Dibenz (a,h) anthracene	UG/L	---	---	---	---	< 0.5 U	---	---	---	---
Dibenzofuran	UG/L	---	---	---	---	< 1 U	---	---	---	---
Diethyl phthalate	UG/L	---	---	---	---	< 5 U	---	---	---	---
Dimethyl phthalate	UG/L	---	---	---	---	< 5 U	---	---	---	---
Di-n-butyl phthalate	UG/L	---	---	---	---	< 5 U	---	---	---	---
Di-n-octyl phthalate	UG/L	---	---	---	---	< 5 U	---	---	---	---
Dinoseb	UG/L	---	---	---	---	< 5 U	---	---	---	---
Disulfoton	UG/L	---	---	---	---	< 48 U	---	---	---	---
d-Limonene	UG/L	---	---	---	---	< 5 U	---	---	---	---
Fluoranthene	UG/L	---	---	---	---	< 0.5 U	---	---	---	---
Fluorene	UG/L	---	---	---	---	< 0.5 U	---	---	---	---
Hexachlorobenzene	UG/L	---	---	---	---	< 0.5 U	---	---	---	---
Hexachlorobutadiene	UG/L	---	---	---	---	< 1 U	---	---	---	---
Hexachlorocyclopentadiene	UG/L	---	---	---	---	< 14 U	---	---	---	---
Hexachloroethane	UG/L	---	---	---	---	< 5 U	---	---	---	---
Indeno (1,2,3-cd) pyrene	UG/L	---	---	---	---	< 0.5 U	---	---	---	---
Isophorone	UG/L	---	---	---	---	< 1 U	---	---	---	---
Naphthalene	UG/L	---	---	---	---	< 0.5 U	---	---	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER I

Property Owner		PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I
Location Description		OLD WELL	OLD WELL	OLD WELL	OLD WELL	OLD WELL	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		142	142	142	142	142	203	203	203	203
Sampled Before Treatment?		Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	NA	NA	NA	NA	Pre-Treatment
Sample ID		NTH0172-08032010-1100	0915201000103	1006201000902	1020201000102	1031201120202	0914201000105	1006201000901	1013201000901	1013201000902
Parameter and units	Sample Date	8/3/2010	9/15/2010	10/6/2010	10/20/2010	10/31/2011	9/14/2010 (Baseline)	10/6/2010	10/13/2010	10/13/2010
Nitrobenzene	UG/L	---	---	---	---	< 1 U	---	---	---	---
N-Nitrosodiethylamine	UG/L	---	---	---	---	< 1 U	---	---	---	---
N-Nitrosodimethylamine	UG/L	---	---	---	---	< 5 U	---	---	---	---
N-Nitrosodi-n-butylamine	UG/L	---	---	---	---	< 5 U	---	---	---	---
N-Nitrosodi-n-propylamine	UG/L	---	---	---	---	< 1 U	---	---	---	---
N-Nitrosodiphenylamine	UG/L	---	---	---	---	< 1 U	---	---	---	---
N-Nitrosomethylethylamine	UG/L	---	---	---	---	< 5 U	---	---	---	---
Parathion-ethyl	UG/L	---	---	---	---	< 5 U	---	---	---	---
Parathion-methyl	UG/L	---	---	---	---	< 5 U	---	---	---	---
Pentachlorobenzene	UG/L	---	---	---	---	< 1 U	---	---	---	---
Pentachlorophenol	UG/L	---	---	---	---	< 5 UJ	---	---	---	---
Phenanthrene	UG/L	---	---	---	---	< 0.5 U	---	---	---	---
Phenol	UG/L	---	---	---	---	< 1 U	---	---	---	---
Phorate	UG/L	---	---	---	---	< 1 U	---	---	---	---
Pronamide	UG/L	---	---	---	---	< 1 U	---	---	---	---
Pyrene	UG/L	---	---	---	---	< 0.5 U	---	---	---	---
Pyridine	UG/L	---	---	---	---	< 5 U	---	---	---	---
Squalene	UG/L	---	---	---	---	< 5 UJ	---	---	---	---
Terbufos	UG/L	---	---	---	---	< 5 U	---	---	---	---
Terpineol	UG/L	---	---	---	---	< 5 U	---	---	---	---
Tributoxyethyl phosphate	UG/L	---	---	---	---	< 5 UJ	---	---	---	---
Trifluralin	UG/L	---	---	---	---	< 5 U	---	---	---	---
TICs										
1,2,3-Trimethylbenzene	UG/L	---	---	---	---	---	---	---	---	---
Volatile Organics										
1,1,1-Trichloroethane	UG/L	---	---	---	---	< 1.00 U	---	---	---	---
1,1,2-Trichloroethane	UG/L	---	---	---	---	< 1.00 U	---	---	---	---
1,1-Dichloroethane	UG/L	---	---	---	---	< 1.00 U	---	---	---	---
1,1-Dichloroethene	UG/L	---	---	---	---	< 1.00 U	---	---	---	---
1,2,3-Trimethylbenzene	UG/L	---	---	---	---	< 1.00 U	---	---	---	---
1,2,4-Trichlorobenzene	UG/L	---	---	---	---	---	---	---	---	---
1,2,4-Trimethylbenzene	UG/L	---	---	---	---	< 1.00 U	---	---	---	---
1,2-Dibromo-3-chloropropane	UG/L	---	---	---	---	< 0.1017 U	---	---	---	---
1,2-Dichlorobenzene	UG/L	---	---	---	---	< 1.00 U	---	---	---	---
1,2-Dichloroethane	UG/L	---	---	---	---	< 1.00 U	---	---	---	---
1,2-Dichloropropane	UG/L	---	---	---	---	---	---	---	---	---
1,3,5-Trimethylbenzene	UG/L	---	---	---	---	< 1.00 U	---	---	---	---
1,3-Dichlorobenzene	UG/L	---	---	---	---	< 1.00 U	---	---	---	---
1,4-Dichlorobenzene	UG/L	---	---	---	---	< 1.00 U	---	---	---	---
Acetone	UG/L	---	---	---	---	< 50.0 U	---	---	---	---
Benzene	UG/L	< 0.500 U	< 0.500 U	---	---	< 1.00 U	< 0.500 U	---	---	---
Carbon disulfide	UG/L	---	---	---	---	< 1.00 U	---	---	---	---
Carbon Tetrachloride	UG/L	---	---	---	---	< 1.00 U	---	---	---	---
Chlorobenzene	UG/L	---	---	---	---	< 1.00 U	---	---	---	---
Chloroform	UG/L	---	---	---	---	< 1.00 U	---	---	---	---
cis-1,2-Dichloroethene	UG/L	---	---	---	---	< 1.00 U	---	---	---	---
Diisopropyl Ether	UG/L	---	---	---	---	< 1.00 U	---	---	---	---
Ethanol	UG/L	---	---	---	---	< 100 U	---	---	---	---
Ethyl tert-Butyl Ether	UG/L	---	---	---	---	< 1.00 U	---	---	---	---
Ethylbenzene	UG/L	< 0.500 U	< 0.500 U	---	---	< 1.00 U	< 0.500 U	---	---	---
Hexachlorobutadiene	UG/L	---	---	---	---	< 1 U	---	---	---	---
Isopropyl alcohol	UG/L	---	---	---	---	< 50.0 U	---	---	---	---
Isopropylbenzene	UG/L	---	---	---	---	< 1.00 U	---	---	---	---
m,p-Xylene	UG/L	---	---	---	---	< 2.00 U	---	---	---	---
Methoxychlor	UG/L	---	---	---	---	< 0.0236 U	---	---	---	---
Methyl tert-Butyl Ether	UG/L	---	---	---	---	< 1.00 U	---	---	---	---
Methylene Chloride	UG/L	---	---	---	---	< 5.00 U	---	---	---	---
Naphthalene	UG/L	---	---	---	---	< 5.00 U	---	---	---	---
o-Xylene	UG/L	---	---	---	---	< 1.00 U	---	---	---	---
Styrene	UG/L	---	---	---	---	---	---	---	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER I

	Property Owner	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I
	Location Description	OLD WELL	OLD WELL	OLD WELL	OLD WELL	OLD WELL	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715
	Source Type	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
	Well Depth	142	142	142	142	142	203	203	203	203
	Sampled Before Treatment?	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	NA	NA	NA	NA	Pre-Treatment
	Sample ID	NTH0172-08032010-1100	0915201000103	1006201000902	1020201000102	1031201120202	0914201000105	1006201000901	1013201000901	1013201000902
Parameter and units	Sample Date	8/3/2010	9/15/2010	10/6/2010	10/20/2010	10/31/2011	9/14/2010 (Baseline)	10/6/2010	10/13/2010	10/13/2010
Tert-Amyl Methyl Ether	UG/L	---	---	---	---	< 1.00 U	---	---	---	---
Tertiary Butyl Alcohol	UG/L	---	---	---	---	< 10.0 U	---	---	---	---
Tetrachloroethene	UG/L	---	---	---	---	< 1.00 U	---	---	---	---
Tetrahydrofuran	UG/L	---	---	---	---	---	---	---	---	---
Toluene	UG/L	< 0.500 U	< 0.500 U	---	---	< 1.00 U	< 0.500 U	---	---	---
trans-1,2-Dichloroethene	UG/L	---	---	---	---	< 1.00 U	---	---	---	---
Trichloroethene	UG/L	---	---	---	---	< 1.00 U	---	---	---	---
Vinyl chloride	UG/L	---	---	---	---	< 1.00 U	---	---	---	---
Xylenes, total	UG/L	< 0.500 U	< 0.500 U	---	---	< 3.00 U	< 0.500 U	---	---	---

Notes:
U : Parameter not detected at posted limit
< : Parameter not detected at posted limit
ND : Parameter not detected
H : Parameter analyzed beyond method recommended holding time
J : Estimated value
--- : Parameter not analyzed.
B : Blank qualified
ug/L : Micrograms per liter
mg/L : Milligrams per liter
NA : Not Available
NTU : Nephelometric Turbidity Unit
umho/cm : Micromhos per centimeter
colonies/100 ml : Colonies per 100 millileters

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER I

Property Owner		PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I
Location Description		NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		203	203	203	203	203	203	203	203	203
Sampled Before Treatment?		NA	NA	Pre-Treatment	Post-Treatment	Pre-Treatment	Post-Treatment	Pre-Treatment	Post-Treatment	Pre-Treatment
Sample ID		1020201000101	1118201000301	0301201124001	0301201124002	0407201120201	0407201120202	0523201120205	0523201120206	0608201120203
Parameter and units	Sample Date	10/20/2010	11/18/2010	3/1/2011	3/1/2011	4/7/2011	4/7/2011	5/23/2011	5/23/2011	6/8/2011
Aldehydes										
Gluteraldehyde	UG/L	---	---	---	---	---	---	< 50.0 U	< 50.0 U	---
Bacteria										
E. coli	colonies/100ml	---	---	---	---	---	---	---	---	---
Fecal coliform bacteria	colonies/100ml	---	---	---	---	---	---	---	---	---
Total Coliform Bacteria	colonies/100ml	---	---	---	---	---	---	---	---	---
DBCP										
1,2-Dibromo-3-chloropropane	UG/L	---	---	---	---	---	---	---	---	---
Extractable Petroleum Hydrocarbons										
Diesel	UG/L	---	---	---	---	---	---	---	---	---
General Chemistry										
Alkalinity, Total (CaCO3)	MG/L	---	---	---	---	---	---	---	---	---
Ammonia as N	MG/L	---	---	---	---	---	---	---	---	---
Bicarbonate Alkalinity as CaCO3	MG/L	---	111	132	117	134	133	135	132	---
Bromide	MG/L	---	---	---	---	---	---	---	---	---
Carbonate as CaCO3	MG/L	---	< 10.0 U	< 10.0 U	23.5	< 10.0 U	< 10.0 U	< 10.0 U	< 10.0 U	---
Chloride	MG/L	---	35.5	18.6	16.4	11.2	13.5	13.5	12.1	---
CO2 by Headspace	UG/L	---	---	---	---	---	---	---	---	---
Cyanide	MG/L	---	---	---	---	---	---	---	---	---
Fluoride	MG/L	---	---	---	---	---	---	---	---	---
MBAS	MG/L	---	< 0.0500 U	< 0.0500 U	0.0764	< 0.0500 U	< 0.0500 U	< 0.0500 U	< 0.0500 U	---
Nitrate	MG/L	---	---	---	---	---	---	< 0.100 U	< 0.100 U	---
Nitrate Nitrogen	MG/L	---	---	---	---	---	---	---	---	---
Nitrite Nitrogen	MG/L	---	---	---	---	---	---	---	---	---
Oil & Grease HEM	MG/L	---	< 5.56 U	< 5.95 U	< 6.02 U	< 6.17 U	< 6.49 U	< 5.75 U	< 5.88 U	---
pH	pH UNITS	---	7.30 J	8.10 HJ	8.40 HJ	8.00 HJ	8.30 HJ	7.90 H	7.70 H	---
Phosphorus	MG/L	---	---	---	---	---	---	---	---	---
Specific conductance	UMHO/CM	---	326	311	338	325	334	---	---	---
Sulfate	MG/L	---	18	15.8	13.2	7.95	7.8	15.2	14.9	---
Temperature of pH determination	CELSIUS	---	21.5 J	21.0 HJ	21.0 HJ	22.8 HJ	22.8 HJ	21.9 H	21.9 H	---
Total Dissolved Solids	MG/L	---	201	200	204	194	183	173	174	---
Total Suspended Solids	MG/L	---	< 1.00 U	45.6	1.9	1.8	1.2	4.3	1.5	---
Turbidity	NTU	---	3.4	5.1	7.2	12.2	2.7	6.6	4	---
Glycols										
1,2-Propylene Glycol	MG/L	---	---	---	---	---	---	< 10.0 U	< 10.0 U	---
Diethylene Glycol	MG/L	---	---	---	---	---	---	---	---	---
Ethylene Glycol	MG/L	---	---	---	---	---	---	< 10.0 U	< 10.0 U	---
Tetraethylene glycol	MG/L	---	---	---	---	---	---	---	---	---
Triethylene glycol	MG/L	---	---	---	---	---	---	---	---	---
Light Gases										
Acetylene	MG/L	---	---	---	---	---	---	---	---	---
Ethane	MG/L	0.754	0.593	0.959 J	< 0.0260 U	0.613	0.048	0.624	0.0625	0.437
Ethene	MG/L	---	---	---	---	---	---	---	---	---
Methane	MG/L	8.82	7.47	17.1	1.76	14.2	2.82	9.21	1.2	3.09
n-Butane	MG/L	---	---	---	---	---	---	---	---	---
Propane	MG/L	0.0388	< 0.0340 U	< 0.0340 U	< 0.0340 U	< 0.0340 U	< 0.0340 U	< 0.0340 U	< 0.0340 U	< 0.0340 U
Low Molecular Weight Acids										
Acetic Acid	UG/L	---	---	---	---	---	---	---	---	---
Butyric Acid	UG/L	---	---	---	---	---	---	---	---	---
Formic Acid	UG/L	---	---	---	---	---	---	---	---	---
Isobutyric acid	UG/L	---	---	---	---	---	---	---	---	---
Lactic acid	UG/L	---	---	---	---	---	---	---	---	---
Propionic Acid	UG/L	---	---	---	---	---	---	---	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER I

Property Owner		PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I
Location Description		NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		203	203	203	203	203	203	203	203	203
Sampled Before Treatment?		NA	NA	Pre-Treatment	Post-Treatment	Pre-Treatment	Post-Treatment	Pre-Treatment	Post-Treatment	Pre-Treatment
Sample ID		1020201000101	1118201000301	0301201124001	0301201124002	0407201120201	0407201120202	0523201120205	0523201120206	0608201120203
Parameter and units	Sample Date	10/20/2010	11/18/2010	3/1/2011	3/1/2011	4/7/2011	4/7/2011	5/23/2011	5/23/2011	6/8/2011
Metals, 6020x										
Cesium	MG/L	---	---	---	---	---	---	---	---	---
Cesium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Potassium	MG/L	---	---	---	---	---	---	---	---	---
Potassium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Silicon	MG/L	---	---	---	---	---	---	---	---	---
Silicon, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Thorium	MG/L	---	---	---	---	---	---	---	---	---
Thorium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Uranium	MG/L	---	---	---	---	---	---	---	---	---
Uranium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Metals, Total										
Aluminum	MG/L	---	---	---	---	---	---	---	---	---
Antimony	MG/L	---	---	---	---	---	---	---	---	---
Arsenic	MG/L	---	< 0.0100 U	< 0.0100 U	< 0.0100 U	< 0.0100 U	< 0.0100 U	< 0.002 U	< 0.002 U	---
Barium	MG/L	---	0.208	0.331	0.0358	0.291	0.229	0.252	0.239	---
Beryllium	MG/L	---	---	---	---	---	---	---	---	---
Boron	MG/L	---	---	---	---	---	---	---	---	---
Cadmium	MG/L	---	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	---	---	---
Calcium	MG/L	---	50.5	34	30.1	31.4	32.6	32.4	32.4	---
Chromium	MG/L	---	< 0.00500 U	< 0.00500 U	< 0.00500 U	< 0.00500 U	< 0.00500 U	---	---	---
Cobalt	MG/L	---	---	---	---	---	---	---	---	---
Copper	MG/L	---	---	---	---	---	---	---	---	---
Hardness, CaCO3	MG/L	---	---	---	---	---	---	99.8	99.4	---
Iron	MG/L	---	0.434	2.18	0.179	1.05	0.0937	0.171	< 0.0500 U	---
Lead	MG/L	---	< 0.00500 U	< 0.00500 U	< 0.00500 U	0.0075	0.0051	---	---	---
Lithium	MG/L	---	---	---	---	---	---	---	---	---
Magnesium	MG/L	---	7.76	5.11	5.57	4.76	4.55	4.58	4.48	---
Manganese	MG/L	---	0.0383	0.145	< 0.0150 U	0.0992	< 0.0150 U	0.0391	0.0662	---
Mercury	MG/L	---	< 0.000200 U	< 0.000200 U	< 0.000200 U	< 0.000200 U	< 0.000200 U	---	---	---
Molybdenum	MG/L	---	---	---	---	---	---	---	---	---
Nickel	MG/L	---	---	---	---	---	---	---	---	---
Potassium	MG/L	---	1.54	2.22	16.7	2.01	1.8	1.88	1.7	---
Selenium	MG/L	---	< 0.0100 U	< 0.0100 U	< 0.0100 U	< 0.0100 U	< 0.0100 U	---	---	---
Silver	MG/L	---	< 0.00500 U	< 0.00500 U	< 0.00500 U	< 0.00500 U	< 0.00500 U	---	---	---
Sodium	MG/L	---	8.15	29.8	26.7 J	33.7	32.5	31.7	31.3	---
Strontium	MG/L	---	---	---	---	---	---	1.45	1.39	---
Sulfur	MG/L	---	4.3	3.01	2.96	2.87	2.81	---	---	---
Thallium	MG/L	---	---	---	---	---	---	---	---	---
Titanium	MG/L	---	---	---	---	---	---	---	---	---
Vanadium	MG/L	---	---	---	---	---	---	---	---	---
Zinc	MG/L	---	---	---	---	---	---	---	---	---
Metals, Dissolved										
Aluminum, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Antimony, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Arsenic, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Barium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Beryllium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Boron, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Cadmium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Calcium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Chromium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Cobalt, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Copper, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Iron, Dissolved	MG/L	---	0.148	---	---	---	---	---	---	---
Lead, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Magnesium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER I

Property Owner		PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I
Location Description		NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		203	203	203	203	203	203	203	203	203
Sampled Before Treatment?		NA	NA	Pre-Treatment	Post-Treatment	Pre-Treatment	Post-Treatment	Pre-Treatment	Post-Treatment	Pre-Treatment
Sample ID		1020201000101	1118201000301	0301201124001	0301201124002	0407201120201	0407201120202	0523201120205	0523201120206	0608201120203
Parameter and units	Sample Date	10/20/2010	11/18/2010	3/1/2011	3/1/2011	4/7/2011	4/7/2011	5/23/2011	5/23/2011	6/8/2011
Manganese, Dissolved	MG/L	---	0.0406	---	---	---	---	---	---	---
Mercury, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Molybdenum, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Nickel, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Potassium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Selenium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Silver, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Sodium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Strontium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Sulfur, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Thallium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Titanium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Vanadium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Zinc, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Miscellaneous Organics										
Inorganic Carbon, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Organic Carbon, Dissolved	MG/L	---	---	---	---	---	---	< 1.00 U	< 1.00 U	---
Pesticides and PCBs										
4,4'-DDD	UG/L	---	---	---	---	---	---	---	---	---
4,4'-DDE	UG/L	---	---	---	---	---	---	---	---	---
4,4'-DDT	UG/L	---	---	---	---	---	---	---	---	---
Aldrin	UG/L	---	---	---	---	---	---	---	---	---
alpha-BHC	UG/L	---	---	---	---	---	---	---	---	---
Azinphos-methyl	UG/L	---	---	---	---	---	---	---	---	---
beta-BHC	UG/L	---	---	---	---	---	---	---	---	---
Carbaryl	UG/L	---	---	---	---	---	---	---	---	---
delta-BHC	UG/L	---	---	---	---	---	---	---	---	---
Dichlorvos	UG/L	---	---	---	---	---	---	---	---	---
Dieldrin	UG/L	---	---	---	---	---	---	---	---	---
Disulfoton	UG/L	---	---	---	---	---	---	---	---	---
Endosulfan I	UG/L	---	---	---	---	---	---	---	---	---
Endosulfan II	UG/L	---	---	---	---	---	---	---	---	---
Endosulfan sulfate	UG/L	---	---	---	---	---	---	---	---	---
Endrin	UG/L	---	---	---	---	---	---	---	---	---
Endrin aldehyde	UG/L	---	---	---	---	---	---	---	---	---
Endrin ketone	UG/L	---	---	---	---	---	---	---	---	---
gamma-BHC (Lindane)	UG/L	---	---	---	---	---	---	---	---	---
Heptachlor	UG/L	---	---	---	---	---	---	---	---	---
Heptachlor epoxide	UG/L	---	---	---	---	---	---	---	---	---
Malathion	UG/L	---	---	---	---	---	---	---	---	---
Methoxychlor	UG/L	---	---	---	---	---	---	---	---	---
Mevinphos	UG/L	---	---	---	---	---	---	---	---	---
Purgeable Petroleum Hydrocarbons										
GRO as Gasoline	UG/L	---	---	---	---	---	---	---	---	---
Semivolatile Organics										
1,2,4,5-Tetrachlorobenzene	UG/L	---	---	---	---	---	---	---	---	---
1,2-Dinitrobenzene	UG/L	---	---	---	---	---	---	---	---	---
1,2-Diphenylhydrazine	UG/L	---	---	---	---	---	---	---	---	---
1,3-Dimethyl adamatane	UG/L	---	---	---	---	---	---	---	---	---
1,3-Dinitrobenzene	UG/L	---	---	---	---	---	---	---	---	---
1,4-Dinitrobenzene	UG/L	---	---	---	---	---	---	---	---	---
1-Chloronaphthalene	UG/L	---	---	---	---	---	---	---	---	---
2,3,4,6-Tetrachlorophenol	UG/L	---	---	---	---	---	---	---	---	---
2,4,5-Trichlorophenol	UG/L	---	---	---	---	---	---	---	---	---
2,4,6-Trichlorophenol	UG/L	---	---	---	---	---	---	---	---	---
2,4-Dichlorophenol	UG/L	---	---	---	---	---	---	---	---	---
2,4-Dimethylphenol	UG/L	---	---	---	---	---	---	---	---	---
2,4-Dinitrophenol	UG/L	---	---	---	---	---	---	---	---	---
2,4-Dinitrotoluene	UG/L	---	---	---	---	---	---	---	---	---

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Property Owner		PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I
Location Description		NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		203	203	203	203	203	203	203	203	203
Sampled Before Treatment?		NA	NA	Pre-Treatment	Post-Treatment	Pre-Treatment	Post-Treatment	Pre-Treatment	Post-Treatment	Pre-Treatment
Sample ID		1020201000101	1118201000301	0301201124001	0301201124002	0407201120201	0407201120202	0523201120205	0523201120206	0608201120203
Parameter and units	Sample Date	10/20/2010	11/18/2010	3/1/2011	3/1/2011	4/7/2011	4/7/2011	5/23/2011	5/23/2011	6/8/2011
2,6-Dichlorophenol	UG/L	---	---	---	---	---	---	---	---	---
2,6-Dinitrotoluene	UG/L	---	---	---	---	---	---	---	---	---
2-Butoxyethanol	UG/L	---	---	---	---	---	---	---	---	---
2-Chloronaphthalene	UG/L	---	---	---	---	---	---	---	---	---
2-Chlorophenol	UG/L	---	---	---	---	---	---	---	---	---
2-Methylnaphthalene	UG/L	---	---	---	---	---	---	---	---	---
2-Methylphenol	UG/L	---	---	---	---	---	---	---	---	---
2-Nitroaniline	UG/L	---	---	---	---	---	---	---	---	---
2-Nitrophenol	UG/L	---	---	---	---	---	---	---	---	---
3,3-Dichlorobenzidine	UG/L	---	---	---	---	---	---	---	---	---
3-Nitroaniline	UG/L	---	---	---	---	---	---	---	---	---
4,4'-Methylenebis(2-chloroaniline)	UG/L	---	---	---	---	---	---	---	---	---
4,4'-Methylenebis(N,N-dimethylanilin	UG/L	---	---	---	---	---	---	---	---	---
4,6-Dinitro-2-methylphenol	UG/L	---	---	---	---	---	---	---	---	---
4-Bromophenyl phenyl ether	UG/L	---	---	---	---	---	---	---	---	---
4-Chloro-3-methylphenol	UG/L	---	---	---	---	---	---	---	---	---
4-Chloroaniline	UG/L	---	---	---	---	---	---	---	---	---
4-Chlorophenyl phenyl ether	UG/L	---	---	---	---	---	---	---	---	---
4-Methylphenol	UG/L	---	---	---	---	---	---	---	---	---
4-Nitroaniline	UG/L	---	---	---	---	---	---	---	---	---
4-Nitrophenol	UG/L	---	---	---	---	---	---	---	---	---
Acenaphthene	UG/L	---	---	---	---	---	---	---	---	---
Acenaphthylene	UG/L	---	---	---	---	---	---	---	---	---
Acetophenone	UG/L	---	---	---	---	---	---	---	---	---
Adamantane	UG/L	---	---	---	---	---	---	---	---	---
Aniline	UG/L	---	---	---	---	---	---	---	---	---
Anthracene	UG/L	---	---	---	---	---	---	---	---	---
Benzo (a) anthracene	UG/L	---	---	---	---	---	---	---	---	---
Benzo (a) pyrene	UG/L	---	---	---	---	---	---	---	---	---
Benzo (b) fluoranthene	UG/L	---	---	---	---	---	---	---	---	---
Benzo (g,h,i) perylene	UG/L	---	---	---	---	---	---	---	---	---
Benzo (k) fluoranthene	UG/L	---	---	---	---	---	---	---	---	---
Benzoic acid	UG/L	---	---	---	---	---	---	---	---	---
Benzyl alcohol	UG/L	---	---	---	---	---	---	---	---	---
Bis(2-chloroethoxy)methane	UG/L	---	---	---	---	---	---	---	---	---
Bis(2-chloroethyl)ether	UG/L	---	---	---	---	---	---	---	---	---
bis(2-Chloroisopropyl)ether	UG/L	---	---	---	---	---	---	---	---	---
Bis(2-ethylhexyl)phthalate	UG/L	---	---	---	---	---	---	---	---	---
Butyl benzyl phthalate	UG/L	---	---	---	---	---	---	---	---	---
Carbazole	UG/L	---	---	---	---	---	---	---	---	---
Chlorobenzilate	UG/L	---	---	---	---	---	---	---	---	---
Chrysene	UG/L	---	---	---	---	---	---	---	---	---
Diallate (cis or trans)	UG/L	---	---	---	---	---	---	---	---	---
Dibenz (a,h) anthracene	UG/L	---	---	---	---	---	---	---	---	---
Dibenzofuran	UG/L	---	---	---	---	---	---	---	---	---
Diethyl phthalate	UG/L	---	---	---	---	---	---	---	---	---
Dimethyl phthalate	UG/L	---	---	---	---	---	---	---	---	---
Di-n-butyl phthalate	UG/L	---	---	---	---	---	---	---	---	---
Di-n-octyl phthalate	UG/L	---	---	---	---	---	---	---	---	---
Dinoseb	UG/L	---	---	---	---	---	---	---	---	---
Disulfoton	UG/L	---	---	---	---	---	---	---	---	---
d-Limonene	UG/L	---	---	---	---	---	---	---	---	---
Fluoranthene	UG/L	---	---	---	---	---	---	---	---	---
Fluorene	UG/L	---	---	---	---	---	---	---	---	---
Hexachlorobenzene	UG/L	---	---	---	---	---	---	---	---	---
Hexachlorobutadiene	UG/L	---	---	---	---	---	---	---	---	---
Hexachlorocyclopentadiene	UG/L	---	---	---	---	---	---	---	---	---
Hexachloroethane	UG/L	---	---	---	---	---	---	---	---	---
Indeno (1,2,3-cd) pyrene	UG/L	---	---	---	---	---	---	---	---	---
Isophorone	UG/L	---	---	---	---	---	---	---	---	---
Naphthalene	UG/L	---	---	---	---	---	---	---	---	---

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Property Owner		PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I
Location Description		NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		203	203	203	203	203	203	203	203	203
Sampled Before Treatment?		NA	NA	Pre-Treatment	Post-Treatment	Pre-Treatment	Post-Treatment	Pre-Treatment	Post-Treatment	Pre-Treatment
Sample ID		1020201000101	1118201000301	0301201124001	0301201124002	0407201120201	0407201120202	0523201120205	0523201120206	0608201120203
Parameter and units	Sample Date	10/20/2010	11/18/2010	3/1/2011	3/1/2011	4/7/2011	4/7/2011	5/23/2011	5/23/2011	6/8/2011
Nitrobenzene	UG/L	---	---	---	---	---	---	---	---	---
N-Nitrosodiethylamine	UG/L	---	---	---	---	---	---	---	---	---
N-Nitrosodimethylamine	UG/L	---	---	---	---	---	---	---	---	---
N-Nitrosodi-n-butylamine	UG/L	---	---	---	---	---	---	---	---	---
N-Nitrosodi-n-propylamine	UG/L	---	---	---	---	---	---	---	---	---
N-Nitrosodiphenylamine	UG/L	---	---	---	---	---	---	---	---	---
N-Nitrosomethylethylamine	UG/L	---	---	---	---	---	---	---	---	---
Parathion-ethyl	UG/L	---	---	---	---	---	---	---	---	---
Parathion-methyl	UG/L	---	---	---	---	---	---	---	---	---
Pentachlorobenzene	UG/L	---	---	---	---	---	---	---	---	---
Pentachlorophenol	UG/L	---	---	---	---	---	---	---	---	---
Phenanthrene	UG/L	---	---	---	---	---	---	---	---	---
Phenol	UG/L	---	---	---	---	---	---	---	---	---
Phorate	UG/L	---	---	---	---	---	---	---	---	---
Pronamide	UG/L	---	---	---	---	---	---	---	---	---
Pyrene	UG/L	---	---	---	---	---	---	---	---	---
Pyridine	UG/L	---	---	---	---	---	---	---	---	---
Squalene	UG/L	---	---	---	---	---	---	---	---	---
Terbufos	UG/L	---	---	---	---	---	---	---	---	---
Terpineol	UG/L	---	---	---	---	---	---	---	---	---
Tributoxyethyl phosphate	UG/L	---	---	---	---	---	---	---	---	---
Trifluralin	UG/L	---	---	---	---	---	---	---	---	---
TICs										
1,2,3-Trimethylbenzene	UG/L	---	---	---	---	---	---	---	---	---
Volatile Organics										
1,1,1-Trichloroethane	UG/L	---	---	---	---	---	---	< 0.500 U	< 0.500 U	---
1,1,2-Trichloroethane	UG/L	---	---	---	---	---	---	---	---	---
1,1-Dichloroethane	UG/L	---	---	---	---	---	---	< 0.500 U	< 0.500 U	---
1,1-Dichloroethene	UG/L	---	---	---	---	---	---	---	---	---
1,2,3-Trimethylbenzene	UG/L	---	---	---	---	---	---	< 0.500 U	< 0.500 U	---
1,2,4-Trichlorobenzene	UG/L	---	---	---	---	---	---	---	---	---
1,2,4-Trimethylbenzene	UG/L	---	---	---	---	---	---	---	---	---
1,2-Dibromo-3-chloropropane	UG/L	---	---	---	---	---	---	---	---	---
1,2-Dichlorobenzene	UG/L	---	---	---	---	---	---	< 0.500 U	< 0.500 U	---
1,2-Dichloroethane	UG/L	---	---	---	---	---	---	< 0.500 U	< 0.500 U	---
1,2-Dichloropropane	UG/L	---	---	---	---	---	---	< 0.500 U	< 0.500 U	---
1,3,5-Trimethylbenzene	UG/L	---	---	---	---	---	---	---	---	---
1,3-Dichlorobenzene	UG/L	---	---	---	---	---	---	---	---	---
1,4-Dichlorobenzene	UG/L	---	---	---	---	---	---	< 0.500 U	< 0.500 U	---
Acetone	UG/L	---	---	---	---	---	---	---	---	---
Benzene	UG/L	---	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	---
Carbon disulfide	UG/L	---	---	---	---	---	---	---	---	---
Carbon Tetrachloride	UG/L	---	---	---	---	---	---	< 0.500 U	< 0.500 U	---
Chlorobenzene	UG/L	---	---	---	---	---	---	< 0.500 U	< 0.500 U	---
Chloroform	UG/L	---	---	---	---	---	---	---	---	---
cis-1,2-Dichloroethene	UG/L	---	---	---	---	---	---	< 0.500 U	< 0.500 U	---
Diisopropyl Ether	UG/L	---	---	---	---	---	---	---	---	---
Ethanol	UG/L	---	---	---	---	---	---	---	---	---
Ethyl tert-Butyl Ether	UG/L	---	---	---	---	---	---	---	---	---
Ethylbenzene	UG/L	---	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	---
Hexachlorobutadiene	UG/L	---	---	---	---	---	---	---	---	---
Isopropyl alcohol	UG/L	---	---	---	---	---	---	---	---	---
Isopropylbenzene	UG/L	---	---	---	---	---	---	---	---	---
m,p-Xylene	UG/L	---	---	---	---	---	---	< 0.500 U	< 0.500 U	---
Methoxychlor	UG/L	---	---	---	---	---	---	---	---	---
Methyl tert-Butyl Ether	UG/L	---	---	---	---	---	---	< 0.500 U	< 0.500 U	---
Methylene Chloride	UG/L	---	---	---	---	---	---	< 5.00 U	< 5.00 U	---
Naphthalene	UG/L	---	---	---	---	---	---	---	---	---
o-Xylene	UG/L	---	---	---	---	---	---	< 0.500 U	< 0.500 U	---
Styrene	UG/L	---	---	---	---	---	---	< 0.500 U	< 0.500 U	---

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	Property Owner	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I
	Location Description	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715
	Source Type	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
	Well Depth	203	203	203	203	203	203	203	203	203
	Sampled Before Treatment?	NA	NA	Pre-Treatment	Post-Treatment	Pre-Treatment	Post-Treatment	Pre-Treatment	Post-Treatment	Pre-Treatment
	Sample ID	1020201000101	1118201000301	0301201124001	0301201124002	0407201120201	0407201120202	0523201120205	0523201120206	0608201120203
Parameter and units	Sample Date	10/20/2010	11/18/2010	3/1/2011	3/1/2011	4/7/2011	4/7/2011	5/23/2011	5/23/2011	6/8/2011
Tert-Amyl Methyl Ether	UG/L	---	---	---	---	---	---	---	---	---
Tertiary Butyl Alcohol	UG/L	---	---	---	---	---	---	---	---	---
Tetrachloroethene	UG/L	---	---	---	---	---	---	< 0.500 U	< 0.500 U	---
Tetrahydrofuran	UG/L	---	---	---	---	---	---	---	---	---
Toluene	UG/L	---	< 0.500 U	1.71	< 0.500 U	0.95	< 0.500 U	< 0.500 U	< 0.500 U	---
trans-1,2-Dichloroethene	UG/L	---	---	---	---	---	---	< 0.500 U	< 0.500 U	---
Trichloroethene	UG/L	---	---	---	---	---	---	< 0.500 U	< 0.500 U	---
Vinyl chloride	UG/L	---	---	---	---	---	---	< 0.500 U	< 0.500 U	---
Xylenes, total	UG/L	---	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	---

Notes:
U : Parameter not detected at posted limit
< : Parameter not detected at posted limit
ND : Parameter not detected
H : Parameter analyzed beyond method recommended holding time
J : Estimated value
--- : Parameter not analyzed.
B : Blank qualified
ug/L : Micrograms per liter
mg/L : Milligrams per liter
NA : Not Available
NTU : Nephelometric Turbidity Unit
umho/cm : Micromhos per centimeter
colonies/100 ml : Colonies per 100 millileters

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER I

Property Owner		PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I
Location Description		NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		203	203	203	203	203	203	203	203	203
Sampled Before Treatment?		Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment
Sample ID		0622201124401	0706201124303	0720201120201	0803201122803	0817201120203	0902201120206	0914201120201	0929201120202	1012201122103
Parameter and units	Sample Date	6/22/2011	7/6/2011	7/20/2011	8/3/2011	8/17/2011	9/2/2011	9/14/2011	9/29/2011	10/12/2011
Aldehydes										
Gluteraldehyde	UG/L	---	---	---	---	---	---	---	---	---
Bacteria										
E. coli	colonies/100ml	---	---	---	---	---	---	---	---	---
Fecal coliform bacteria	colonies/100ml	---	---	---	---	---	---	---	---	---
Total Coliform Bacteria	colonies/100ml	---	---	---	---	---	---	---	---	---
DBCP										
1,2-Dibromo-3-chloropropane	UG/L	---	---	---	---	---	---	---	---	---
Extractable Petroleum Hydrocarbons										
Diesel	UG/L	---	---	---	---	---	---	---	---	---
General Chemistry										
Alkalinity, Total (CaCO3)	MG/L	---	---	---	---	---	---	---	---	---
Ammonia as N	MG/L	---	---	---	---	---	---	---	---	---
Bicarbonate Alkalinity as CaCO3	MG/L	---	---	---	---	---	---	---	---	---
Bromide	MG/L	---	---	---	---	---	---	---	---	---
Carbonate as CaCO3	MG/L	---	---	---	---	---	---	---	---	---
Chloride	MG/L	---	---	---	---	---	---	---	---	---
CO2 by Headspace	UG/L	---	---	---	---	---	---	---	---	---
Cyanide	MG/L	---	---	---	---	---	---	---	---	---
Fluoride	MG/L	---	---	---	---	---	---	---	---	---
MBAS	MG/L	---	---	---	---	---	---	---	---	---
Nitrate	MG/L	---	---	---	---	---	---	---	---	---
Nitrate Nitrogen	MG/L	---	---	---	---	---	---	---	---	---
Nitrite Nitrogen	MG/L	---	---	---	---	---	---	---	---	---
Oil & Grease HEM	MG/L	---	---	---	---	---	---	---	---	---
pH	pH UNITS	---	---	---	---	---	---	---	---	---
Phosphorus	MG/L	---	---	---	---	---	---	---	---	---
Specific conductance	UMHO/CM	---	---	---	---	---	---	---	---	---
Sulfate	MG/L	---	---	---	---	---	---	---	---	---
Temperature of pH determination	CELSIUS	---	---	---	---	---	---	---	---	---
Total Dissolved Solids	MG/L	---	---	---	---	---	---	---	---	---
Total Suspended Solids	MG/L	---	---	---	---	---	---	---	---	---
Turbidity	NTU	---	---	---	---	---	---	---	---	---
Glycols										
1,2-Propylene Glycol	MG/L	---	---	---	---	---	---	---	---	---
Diethylene Glycol	MG/L	---	---	---	---	---	---	---	---	---
Ethylene Glycol	MG/L	---	---	---	---	---	---	---	---	---
Tetraethylene glycol	MG/L	---	---	---	---	---	---	---	---	---
Triethylene glycol	MG/L	---	---	---	---	---	---	---	---	---
Light Gases										
Acetylene	MG/L	---	---	---	---	---	---	---	---	---
Ethane	MG/L	0.543	0.6	0.511	0.364	0.421	0.424	0.467	0.445	0.19
Ethene	MG/L	---	---	---	---	---	---	---	---	---
Methane	MG/L	10.4	10.8	6.65	10.4	8.88	6.23	9.87 J	9.62	4.1
n-Butane	MG/L	---	---	---	---	---	---	---	---	---
Propane	MG/L	< 0.0340 U	< 0.0340 U	< 0.0340 U	< 0.0340 U	< 0.0340 U	< 0.00500 U	< 0.00500 U	< 0.00500 U	< 0.00500 U
Low Molecular Weight Acids										
Acetic Acid	UG/L	---	---	---	---	---	---	---	---	---
Butyric Acid	UG/L	---	---	---	---	---	---	---	---	---
Formic Acid	UG/L	---	---	---	---	---	---	---	---	---
Isobutyric acid	UG/L	---	---	---	---	---	---	---	---	---
Lactic acid	UG/L	---	---	---	---	---	---	---	---	---
Propionic Acid	UG/L	---	---	---	---	---	---	---	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER I

Property Owner		PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I
Location Description		NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		203	203	203	203	203	203	203	203	203
Sampled Before Treatment?		Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment
Sample ID		0622201124401	0706201124303	0720201120201	0803201122803	0817201120203	0902201120206	0914201120201	0929201120202	1012201122103
Parameter and units	Sample Date	6/22/2011	7/6/2011	7/20/2011	8/3/2011	8/17/2011	9/2/2011	9/14/2011	9/29/2011	10/12/2011
Metals, 6020x										
Cesium	MG/L	---	---	---	---	---	---	---	---	---
Cesium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Potassium	MG/L	---	---	---	---	---	---	---	---	---
Potassium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Silicon	MG/L	---	---	---	---	---	---	---	---	---
Silicon, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Thorium	MG/L	---	---	---	---	---	---	---	---	---
Thorium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Uranium	MG/L	---	---	---	---	---	---	---	---	---
Uranium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Metals, Total										
Aluminum	MG/L	---	---	---	---	---	---	---	---	---
Antimony	MG/L	---	---	---	---	---	---	---	---	---
Arsenic	MG/L	---	---	---	---	---	---	---	---	---
Barium	MG/L	---	---	---	---	---	---	---	---	---
Beryllium	MG/L	---	---	---	---	---	---	---	---	---
Boron	MG/L	---	---	---	---	---	---	---	---	---
Cadmium	MG/L	---	---	---	---	---	---	---	---	---
Calcium	MG/L	---	---	---	---	---	---	---	---	---
Chromium	MG/L	---	---	---	---	---	---	---	---	---
Cobalt	MG/L	---	---	---	---	---	---	---	---	---
Copper	MG/L	---	---	---	---	---	---	---	---	---
Hardness, CaCO3	MG/L	---	---	---	---	---	---	---	---	---
Iron	MG/L	---	---	---	---	---	---	---	---	---
Lead	MG/L	---	---	---	---	---	---	---	---	---
Lithium	MG/L	---	---	---	---	---	---	---	---	---
Magnesium	MG/L	---	---	---	---	---	---	---	---	---
Manganese	MG/L	---	---	---	---	---	---	---	---	---
Mercury	MG/L	---	---	---	---	---	---	---	---	---
Molybdenum	MG/L	---	---	---	---	---	---	---	---	---
Nickel	MG/L	---	---	---	---	---	---	---	---	---
Potassium	MG/L	---	---	---	---	---	---	---	---	---
Selenium	MG/L	---	---	---	---	---	---	---	---	---
Silver	MG/L	---	---	---	---	---	---	---	---	---
Sodium	MG/L	---	---	---	---	---	---	---	---	---
Strontium	MG/L	---	---	---	---	---	---	---	---	---
Sulfur	MG/L	---	---	---	---	---	---	---	---	---
Thallium	MG/L	---	---	---	---	---	---	---	---	---
Titanium	MG/L	---	---	---	---	---	---	---	---	---
Vanadium	MG/L	---	---	---	---	---	---	---	---	---
Zinc	MG/L	---	---	---	---	---	---	---	---	---
Metals, Dissolved										
Aluminum, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Antimony, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Arsenic, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Barium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Beryllium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Boron, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Cadmium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Calcium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Chromium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Cobalt, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Copper, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Iron, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Lead, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Magnesium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER I

	Property Owner	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I
	Location Description	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715
	Source Type	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
	Well Depth	203	203	203	203	203	203	203	203	203
	Sampled Before Treatment?	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment
	Sample ID	0622201124401	0706201124303	0720201120201	0803201122803	0817201120203	0902201120206	0914201120201	0929201120202	1012201122103
Parameter and units	Sample Date	6/22/2011	7/6/2011	7/20/2011	8/3/2011	8/17/2011	9/2/2011	9/14/2011	9/29/2011	10/12/2011
Manganese, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Mercury, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Molybdenum, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Nickel, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Potassium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Selenium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Silver, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Sodium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Strontium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Sulfur, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Thallium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Titanium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Vanadium, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Zinc, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Miscellaneous Organics										
Inorganic Carbon, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Organic Carbon, Dissolved	MG/L	---	---	---	---	---	---	---	---	---
Pesticides and PCBs										
4,4'-DDD	UG/L	---	---	---	---	---	---	---	---	---
4,4'-DDE	UG/L	---	---	---	---	---	---	---	---	---
4,4'-DDT	UG/L	---	---	---	---	---	---	---	---	---
Aldrin	UG/L	---	---	---	---	---	---	---	---	---
alpha-BHC	UG/L	---	---	---	---	---	---	---	---	---
Azinphos-methyl	UG/L	---	---	---	---	---	---	---	---	---
beta-BHC	UG/L	---	---	---	---	---	---	---	---	---
Carbaryl	UG/L	---	---	---	---	---	---	---	---	---
delta-BHC	UG/L	---	---	---	---	---	---	---	---	---
Dichlorvos	UG/L	---	---	---	---	---	---	---	---	---
Dieldrin	UG/L	---	---	---	---	---	---	---	---	---
Disulfoton	UG/L	---	---	---	---	---	---	---	---	---
Endosulfan I	UG/L	---	---	---	---	---	---	---	---	---
Endosulfan II	UG/L	---	---	---	---	---	---	---	---	---
Endosulfan sulfate	UG/L	---	---	---	---	---	---	---	---	---
Endrin	UG/L	---	---	---	---	---	---	---	---	---
Endrin aldehyde	UG/L	---	---	---	---	---	---	---	---	---
Endrin ketone	UG/L	---	---	---	---	---	---	---	---	---
gamma-BHC (Lindane)	UG/L	---	---	---	---	---	---	---	---	---
Heptachlor	UG/L	---	---	---	---	---	---	---	---	---
Heptachlor epoxide	UG/L	---	---	---	---	---	---	---	---	---
Malathion	UG/L	---	---	---	---	---	---	---	---	---
Methoxychlor	UG/L	---	---	---	---	---	---	---	---	---
Mevinphos	UG/L	---	---	---	---	---	---	---	---	---
Purgeable Petroleum Hydrocarbons										
GRO as Gasoline	UG/L	---	---	---	---	---	---	---	---	---
Semivolatile Organics										
1,2,4,5-Tetrachlorobenzene	UG/L	---	---	---	---	---	---	---	---	---
1,2-Dinitrobenzene	UG/L	---	---	---	---	---	---	---	---	---
1,2-Diphenylhydrazine	UG/L	---	---	---	---	---	---	---	---	---
1,3-Dimethyl adamatane	UG/L	---	---	---	---	---	---	---	---	---
1,3-Dinitrobenzene	UG/L	---	---	---	---	---	---	---	---	---
1,4-Dinitrobenzene	UG/L	---	---	---	---	---	---	---	---	---
1-Chloronaphthalene	UG/L	---	---	---	---	---	---	---	---	---
2,3,4,6-Tetrachlorophenol	UG/L	---	---	---	---	---	---	---	---	---
2,4,5-Trichlorophenol	UG/L	---	---	---	---	---	---	---	---	---
2,4,6-Trichlorophenol	UG/L	---	---	---	---	---	---	---	---	---
2,4-Dichlorophenol	UG/L	---	---	---	---	---	---	---	---	---
2,4-Dimethylphenol	UG/L	---	---	---	---	---	---	---	---	---
2,4-Dinitrophenol	UG/L	---	---	---	---	---	---	---	---	---
2,4-Dinitrotoluene	UG/L	---	---	---	---	---	---	---	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER I

	Property Owner	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I
	Location Description	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715
	Source Type	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
	Well Depth	203	203	203	203	203	203	203	203	203
	Sampled Before Treatment?	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment
	Sample ID	0622201124401	0706201124303	0720201120201	0803201122803	0817201120203	0902201120206	0914201120201	0929201120202	1012201122103
Parameter and units	Sample Date	6/22/2011	7/6/2011	7/20/2011	8/3/2011	8/17/2011	9/2/2011	9/14/2011	9/29/2011	10/12/2011
2,6-Dichlorophenol	UG/L	---	---	---	---	---	---	---	---	---
2,6-Dinitrotoluene	UG/L	---	---	---	---	---	---	---	---	---
2-Butoxyethanol	UG/L	---	---	---	---	---	---	---	---	---
2-Chloronaphthalene	UG/L	---	---	---	---	---	---	---	---	---
2-Chlorophenol	UG/L	---	---	---	---	---	---	---	---	---
2-Methylnaphthalene	UG/L	---	---	---	---	---	---	---	---	---
2-Methylphenol	UG/L	---	---	---	---	---	---	---	---	---
2-Nitroaniline	UG/L	---	---	---	---	---	---	---	---	---
2-Nitrophenol	UG/L	---	---	---	---	---	---	---	---	---
3,3-Dichlorobenzidine	UG/L	---	---	---	---	---	---	---	---	---
3-Nitroaniline	UG/L	---	---	---	---	---	---	---	---	---
4,4'-Methylenebis(2-chloroaniline)	UG/L	---	---	---	---	---	---	---	---	---
4,4'-Methylenebis(N,N-dimethylanilin	UG/L	---	---	---	---	---	---	---	---	---
4,6-Dinitro-2-methylphenol	UG/L	---	---	---	---	---	---	---	---	---
4-Bromophenyl phenyl ether	UG/L	---	---	---	---	---	---	---	---	---
4-Chloro-3-methylphenol	UG/L	---	---	---	---	---	---	---	---	---
4-Chloroaniline	UG/L	---	---	---	---	---	---	---	---	---
4-Chlorophenyl phenyl ether	UG/L	---	---	---	---	---	---	---	---	---
4-Methylphenol	UG/L	---	---	---	---	---	---	---	---	---
4-Nitroaniline	UG/L	---	---	---	---	---	---	---	---	---
4-Nitrophenol	UG/L	---	---	---	---	---	---	---	---	---
Acenaphthene	UG/L	---	---	---	---	---	---	---	---	---
Acenaphthylene	UG/L	---	---	---	---	---	---	---	---	---
Acetophenone	UG/L	---	---	---	---	---	---	---	---	---
Adamantane	UG/L	---	---	---	---	---	---	---	---	---
Aniline	UG/L	---	---	---	---	---	---	---	---	---
Anthracene	UG/L	---	---	---	---	---	---	---	---	---
Benzo (a) anthracene	UG/L	---	---	---	---	---	---	---	---	---
Benzo (a) pyrene	UG/L	---	---	---	---	---	---	---	---	---
Benzo (b) fluoranthene	UG/L	---	---	---	---	---	---	---	---	---
Benzo (g,h,i) perylene	UG/L	---	---	---	---	---	---	---	---	---
Benzo (k) fluoranthene	UG/L	---	---	---	---	---	---	---	---	---
Benzoic acid	UG/L	---	---	---	---	---	---	---	---	---
Benzyl alcohol	UG/L	---	---	---	---	---	---	---	---	---
Bis(2-chloroethoxy)methane	UG/L	---	---	---	---	---	---	---	---	---
Bis(2-chloroethyl)ether	UG/L	---	---	---	---	---	---	---	---	---
bis(2-Chloroisopropyl)ether	UG/L	---	---	---	---	---	---	---	---	---
Bis(2-ethylhexyl)phthalate	UG/L	---	---	---	---	---	---	---	---	---
Butyl benzyl phthalate	UG/L	---	---	---	---	---	---	---	---	---
Carbazole	UG/L	---	---	---	---	---	---	---	---	---
Chlorobenzilate	UG/L	---	---	---	---	---	---	---	---	---
Chrysene	UG/L	---	---	---	---	---	---	---	---	---
Diallate (cis or trans)	UG/L	---	---	---	---	---	---	---	---	---
Dibenz (a,h) anthracene	UG/L	---	---	---	---	---	---	---	---	---
Dibenzofuran	UG/L	---	---	---	---	---	---	---	---	---
Diethyl phthalate	UG/L	---	---	---	---	---	---	---	---	---
Dimethyl phthalate	UG/L	---	---	---	---	---	---	---	---	---
Di-n-butyl phthalate	UG/L	---	---	---	---	---	---	---	---	---
Di-n-octyl phthalate	UG/L	---	---	---	---	---	---	---	---	---
Dinoseb	UG/L	---	---	---	---	---	---	---	---	---
Disulfoton	UG/L	---	---	---	---	---	---	---	---	---
d-Limonene	UG/L	---	---	---	---	---	---	---	---	---
Fluoranthene	UG/L	---	---	---	---	---	---	---	---	---
Fluorene	UG/L	---	---	---	---	---	---	---	---	---
Hexachlorobenzene	UG/L	---	---	---	---	---	---	---	---	---
Hexachlorobutadiene	UG/L	---	---	---	---	---	---	---	---	---
Hexachlorocyclopentadiene	UG/L	---	---	---	---	---	---	---	---	---
Hexachloroethane	UG/L	---	---	---	---	---	---	---	---	---
Indeno (1,2,3-cd) pyrene	UG/L	---	---	---	---	---	---	---	---	---
Isophorone	UG/L	---	---	---	---	---	---	---	---	---
Naphthalene	UG/L	---	---	---	---	---	---	---	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER I

Property Owner		PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I
Location Description		NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715
Source Type		WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
Well Depth		203	203	203	203	203	203	203	203	203
Sampled Before Treatment?		Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment
Sample ID		0622201124401	0706201124303	0720201120201	0803201122803	0817201120203	0902201120206	0914201120201	0929201120202	1012201122103
Parameter and units	Sample Date	6/22/2011	7/6/2011	7/20/2011	8/3/2011	8/17/2011	9/2/2011	9/14/2011	9/29/2011	10/12/2011
Nitrobenzene	UG/L	---	---	---	---	---	---	---	---	---
N-Nitrosodiethylamine	UG/L	---	---	---	---	---	---	---	---	---
N-Nitrosodimethylamine	UG/L	---	---	---	---	---	---	---	---	---
N-Nitrosodi-n-butylamine	UG/L	---	---	---	---	---	---	---	---	---
N-Nitrosodi-n-propylamine	UG/L	---	---	---	---	---	---	---	---	---
N-Nitrosodiphenylamine	UG/L	---	---	---	---	---	---	---	---	---
N-Nitrosomethylethylamine	UG/L	---	---	---	---	---	---	---	---	---
Parathion-ethyl	UG/L	---	---	---	---	---	---	---	---	---
Parathion-methyl	UG/L	---	---	---	---	---	---	---	---	---
Pentachlorobenzene	UG/L	---	---	---	---	---	---	---	---	---
Pentachlorophenol	UG/L	---	---	---	---	---	---	---	---	---
Phenanthrene	UG/L	---	---	---	---	---	---	---	---	---
Phenol	UG/L	---	---	---	---	---	---	---	---	---
Phorate	UG/L	---	---	---	---	---	---	---	---	---
Pronamide	UG/L	---	---	---	---	---	---	---	---	---
Pyrene	UG/L	---	---	---	---	---	---	---	---	---
Pyridine	UG/L	---	---	---	---	---	---	---	---	---
Squalene	UG/L	---	---	---	---	---	---	---	---	---
Terbufos	UG/L	---	---	---	---	---	---	---	---	---
Terpineol	UG/L	---	---	---	---	---	---	---	---	---
Tributoxyethyl phosphate	UG/L	---	---	---	---	---	---	---	---	---
Trifluralin	UG/L	---	---	---	---	---	---	---	---	---
TICs										
1,2,3-Trimethylbenzene	UG/L	---	---	---	---	---	---	---	---	---
Volatile Organics										
1,1,1-Trichloroethane	UG/L	---	---	---	---	---	---	---	---	---
1,1,2-Trichloroethane	UG/L	---	---	---	---	---	---	---	---	---
1,1-Dichloroethane	UG/L	---	---	---	---	---	---	---	---	---
1,1-Dichloroethene	UG/L	---	---	---	---	---	---	---	---	---
1,2,3-Trimethylbenzene	UG/L	---	---	---	---	---	---	---	---	---
1,2,4-Trichlorobenzene	UG/L	---	---	---	---	---	---	---	---	---
1,2,4-Trimethylbenzene	UG/L	---	---	---	---	---	---	---	---	---
1,2-Dibromo-3-chloropropane	UG/L	---	---	---	---	---	---	---	---	---
1,2-Dichlorobenzene	UG/L	---	---	---	---	---	---	---	---	---
1,2-Dichloroethane	UG/L	---	---	---	---	---	---	---	---	---
1,2-Dichloropropane	UG/L	---	---	---	---	---	---	---	---	---
1,3,5-Trimethylbenzene	UG/L	---	---	---	---	---	---	---	---	---
1,3-Dichlorobenzene	UG/L	---	---	---	---	---	---	---	---	---
1,4-Dichlorobenzene	UG/L	---	---	---	---	---	---	---	---	---
Acetone	UG/L	---	---	---	---	---	---	---	---	---
Benzene	UG/L	---	---	---	---	---	---	---	---	---
Carbon disulfide	UG/L	---	---	---	---	---	---	---	---	---
Carbon Tetrachloride	UG/L	---	---	---	---	---	---	---	---	---
Chlorobenzene	UG/L	---	---	---	---	---	---	---	---	---
Chloroform	UG/L	---	---	---	---	---	---	---	---	---
cis-1,2-Dichloroethene	UG/L	---	---	---	---	---	---	---	---	---
Diisopropyl Ether	UG/L	---	---	---	---	---	---	---	---	---
Ethanol	UG/L	---	---	---	---	---	---	---	---	---
Ethyl tert-Butyl Ether	UG/L	---	---	---	---	---	---	---	---	---
Ethylbenzene	UG/L	---	---	---	---	---	---	---	---	---
Hexachlorobutadiene	UG/L	---	---	---	---	---	---	---	---	---
Isopropyl alcohol	UG/L	---	---	---	---	---	---	---	---	---
Isopropylbenzene	UG/L	---	---	---	---	---	---	---	---	---
m,p-Xylene	UG/L	---	---	---	---	---	---	---	---	---
Methoxychlor	UG/L	---	---	---	---	---	---	---	---	---
Methyl tert-Butyl Ether	UG/L	---	---	---	---	---	---	---	---	---
Methylene Chloride	UG/L	---	---	---	---	---	---	---	---	---
Naphthalene	UG/L	---	---	---	---	---	---	---	---	---
o-Xylene	UG/L	---	---	---	---	---	---	---	---	---
Styrene	UG/L	---	---	---	---	---	---	---	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER I

	Property Owner	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I
	Location Description	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715
	Source Type	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
	Well Depth	203	203	203	203	203	203	203	203	203
	Sampled Before Treatment?	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment
	Sample ID	0622201124401	0706201124303	0720201120201	0803201122803	0817201120203	0902201120206	0914201120201	0929201120202	1012201122103
Parameter and units	Sample Date	6/22/2011	7/6/2011	7/20/2011	8/3/2011	8/17/2011	9/2/2011	9/14/2011	9/29/2011	10/12/2011
Tert-Amyl Methyl Ether	UG/L	---	---	---	---	---	---	---	---	---
Tertiary Butyl Alcohol	UG/L	---	---	---	---	---	---	---	---	---
Tetrachloroethene	UG/L	---	---	---	---	---	---	---	---	---
Tetrahydrofuran	UG/L	---	---	---	---	---	---	---	---	---
Toluene	UG/L	---	---	---	---	---	---	---	---	---
trans-1,2-Dichloroethene	UG/L	---	---	---	---	---	---	---	---	---
Trichloroethene	UG/L	---	---	---	---	---	---	---	---	---
Vinyl chloride	UG/L	---	---	---	---	---	---	---	---	---
Xylenes, total	UG/L	---	---	---	---	---	---	---	---	---

Notes:
U : Parameter not detected at posted limit
< : Parameter not detected at posted limit
ND : Parameter not detected
H : Parameter analyzed beyond method recommended holding time
J : Estimated value
--- : Parameter not analyzed.
B : Blank qualified
ug/L : Micrograms per liter
mg/L : Milligrams per liter
NA : Not Available
NTU : Nephelometric Turbidity Unit
umho/cm : Micromhos per centimeter
colonies/100 ml : Colonies per 100 millileters

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER I

Property Owner		PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I
Location Description		NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715
Source Type		WELL	WELL	WELL	WELL
Well Depth		203	203	203	203
Sampled Before Treatment?		Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment
Sample ID		1031201120201	1109201124303	1122201124301	1207201122202
Parameter and units	Sample Date	10/31/2011	11/9/2011	11/22/2011	12/7/2011
Aldehydes					
Gluteraldehyde	UG/L	---	---	---	---
Bacteria					
E. coli	colonies/100ml	Absent	---	---	---
Fecal coliform bacteria	colonies/100ml	< 1 U	---	---	---
Total Coliform Bacteria	colonies/100ml	Absent	---	---	---
DBCP					
1,2-Dibromo-3-chloropropane	UG/L	< 0.1014 U	---	---	---
Extractable Petroleum Hydrocarbons					
Diesel	UG/L	< 95.2 U	---	---	---
General Chemistry					
Alkalinity, Total (CaCO3)	MG/L	137	---	---	---
Ammonia as N	MG/L	< 0.100 U	---	---	---
Bicarbonate Alkalinity as CaCO3	MG/L	137	---	---	---
Bromide	MG/L	< 2.5 UJ	---	---	---
Carbonate as CaCO3	MG/L	< 10.0 U	---	---	---
Chloride	MG/L	13.5 J	---	---	---
CO2 by Headspace	UG/L	< 12000 U	---	---	---
Cyanide	MG/L	---	---	---	---
Fluoride	MG/L	< 0.50 UJ	---	---	---
MBAS	MG/L	< 0.12 U	---	---	---
Nitrate	MG/L	---	---	---	---
Nitrate Nitrogen	MG/L	< 0.50 U	---	---	---
Nitrite Nitrogen	MG/L	< 0.50 UJ	---	---	---
Oil & Grease HEM	MG/L	< 5.33 U	---	---	---
pH	pH UNITS	7.50 H	---	---	---
Phosphorus	MG/L	< 0.100 U	---	---	---
Specific conductance	UMHO/CM	318	---	---	---
Sulfate	MG/L	12.3 J	---	---	---
Temperature of pH determination	CELSIUS	21.6 H	---	---	---
Total Dissolved Solids	MG/L	172	---	---	---
Total Suspended Solids	MG/L	3.5	---	---	---
Turbidity	NTU	5.4	---	---	---
Glycols					
1,2-Propylene Glycol	MG/L	---	---	---	---
Diethylene Glycol	MG/L	< 10 U	---	---	---
Ethylene Glycol	MG/L	---	---	---	---
Tetraethylene glycol	MG/L	< 10 UJ	---	---	---
Triethylene glycol	MG/L	< 10 U	---	---	---
Light Gases					
Acetylene	MG/L	< 0.00500 U	---	---	---
Ethane	MG/L	0.402	0.395	0.418	0.118
Ethene	MG/L	< 0.00500 U	---	---	---
Methane	MG/L	6.09	4.94	5.51	3.6
n-Butane	MG/L	< 0.00500 U	---	---	---
Propane	MG/L	< 0.00500 U	< 0.00500 U	< 0.00500 U	< 0.00500 U
Low Molecular Weight Acids					
Acetic Acid	UG/L	< 10000 U	---	---	---
Butyric Acid	UG/L	< 10000 U	---	---	---
Formic Acid	UG/L	< 10000 U	---	---	---
Isobutyric acid	UG/L	< 10000 U	---	---	---
Lactic acid	UG/L	< 5000 U	---	---	---
Propionic Acid	UG/L	< 13000 U	---	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER I

Property Owner		PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I
Location Description		NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715
Source Type		WELL	WELL	WELL	WELL
Well Depth		203	203	203	203
Sampled Before Treatment?		Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment
Sample ID		1031201120201	1109201124303	1122201124301	1207201122202
Parameter and units	Sample Date	10/31/2011	11/9/2011	11/22/2011	12/7/2011
Metals, 6020x					
Cesium	MG/L	< 0.25 U	---	---	---
Cesium, Dissolved	MG/L	< 0.1 U	---	---	---
Potassium	MG/L	< 250 U	---	---	---
Potassium, Dissolved	MG/L	< 100 U	---	---	---
Silicon	MG/L	< 6250 U	---	---	---
Silicon, Dissolved	MG/L	< 2500 U	---	---	---
Thorium	MG/L	< 5 U	---	---	---
Thorium, Dissolved	MG/L	< 2 U	---	---	---
Uranium	MG/L	< 2.5 U	---	---	---
Uranium, Dissolved	MG/L	< 1 U	---	---	---
Metals, Total					
Aluminum	MG/L	0.310, 0.112	---	---	---
Antimony	MG/L	< 0.00200 U	---	---	---
Arsenic	MG/L	< 0.00200 U	---	---	---
Barium	MG/L	0.227	---	---	---
Beryllium	MG/L	< 0.00200 U	---	---	---
Boron	MG/L	0.0918	---	---	---
Cadmium	MG/L	< 0.00100 U	---	---	---
Calcium	MG/L	30.6	---	---	---
Chromium	MG/L	< 0.00200 U	---	---	---
Cobalt	MG/L	< 0.00200 U	---	---	---
Copper	MG/L	< 0.00500 U	---	---	---
Hardness, CaCO3	MG/L	---	---	---	---
Iron	MG/L	0.184	---	---	---
Lead	MG/L	< 0.00200 U	---	---	---
Lithium	MG/L	---	---	---	---
Magnesium	MG/L	4.29	---	---	---
Manganese	MG/L	0.019	---	---	---
Mercury	MG/L	< 0.000200 U	---	---	---
Molybdenum	MG/L	< 0.00500 U	---	---	---
Nickel	MG/L	< 0.00500 U	---	---	---
Potassium	MG/L	1.62	---	---	---
Selenium	MG/L	< 0.00200 U	---	---	---
Silver	MG/L	< 0.00200 U	---	---	---
Sodium	MG/L	33.7	---	---	---
Strontium	MG/L	1.32	---	---	---
Sulfur	MG/L	2.74	---	---	---
Thallium	MG/L	< 0.00200 U	---	---	---
Titanium	MG/L	0.00773	---	---	---
Vanadium	MG/L	< 0.00400 U	---	---	---
Zinc	MG/L	< 0.0500 U	---	---	---
Metals, Dissolved					
Aluminum, Dissolved	MG/L	< 0.0200 U	---	---	---
Antimony, Dissolved	MG/L	< 0.00200 U	---	---	---
Arsenic, Dissolved	MG/L	< 0.00200 U	---	---	---
Barium, Dissolved	MG/L	0.223	---	---	---
Beryllium, Dissolved	MG/L	< 0.00200 U	---	---	---
Boron, Dissolved	MG/L	0.0839	---	---	---
Cadmium, Dissolved	MG/L	< 0.00100 U	---	---	---
Calcium, Dissolved	MG/L	28.6	---	---	---
Chromium, Dissolved	MG/L	< 0.00200 U	---	---	---
Cobalt, Dissolved	MG/L	< 0.00200 U	---	---	---
Copper, Dissolved	MG/L	< 0.00500 U	---	---	---
Iron, Dissolved	MG/L	< 0.0500 U	---	---	---
Lead, Dissolved	MG/L	< 0.00200 U	---	---	---
Magnesium, Dissolved	MG/L	4.04	---	---	---

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Property Owner		PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I
Location Description		NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715
Source Type		WELL	WELL	WELL	WELL
Well Depth		203	203	203	203
Sampled Before Treatment?		Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment
Sample ID		1031201120201	1109201124303	1122201124301	1207201122202
Parameter and units	Sample Date	10/31/2011	11/9/2011	11/22/2011	12/7/2011
Manganese, Dissolved	MG/L	< 0.00500 U	---	---	---
Mercury, Dissolved	MG/L	< 0.000200 U	---	---	---
Molybdenum, Dissolved	MG/L	< 0.00500 U	---	---	---
Nickel, Dissolved	MG/L	< 0.00500 U	---	---	---
Potassium, Dissolved	MG/L	1.49	---	---	---
Selenium, Dissolved	MG/L	< 0.00200 U	---	---	---
Silver, Dissolved	MG/L	< 0.00200 U	---	---	---
Sodium, Dissolved	MG/L	34.8	---	---	---
Strontium, Dissolved	MG/L	1.24	---	---	---
Sulfur, Dissolved	MG/L	2.47	---	---	---
Thallium, Dissolved	MG/L	< 0.00200 U	---	---	---
Titanium, Dissolved	MG/L	< 0.00200 U	---	---	---
Vanadium, Dissolved	MG/L	< 0.00400 U	---	---	---
Zinc, Dissolved	MG/L	< 0.0500 U	---	---	---
Miscellaneous Organics					
Inorganic Carbon, Dissolved	MG/L	31.4	---	---	---
Organic Carbon, Dissolved	MG/L	< 1.00 U	---	---	---
Pesticides and PCBs					
4,4'-DDD	UG/L	< 0.0236 U	---	---	---
4,4'-DDE	UG/L	< 0.0236 U	---	---	---
4,4'-DDT	UG/L	< 0.0236 U	---	---	---
Aldrin	UG/L	< 0.0236 U	---	---	---
alpha-BHC	UG/L	< 0.0236 U	---	---	---
Azinphos-methyl	UG/L	< 0.94 U	---	---	---
beta-BHC	UG/L	< 0.0236 U	---	---	---
Carbaryl	UG/L	< 6.0 U	---	---	---
delta-BHC	UG/L	< 0.0236 U	---	---	---
Dichlorvos	UG/L	< 0.94 U	---	---	---
Dieldrin	UG/L	< 0.0236 U	---	---	---
Disulfoton	UG/L	< 0.94 U	---	---	---
Endosulfan I	UG/L	< 0.0236 U	---	---	---
Endosulfan II	UG/L	< 0.0236 U	---	---	---
Endosulfan sulfate	UG/L	< 0.0236 U	---	---	---
Endrin	UG/L	< 0.0236 U	---	---	---
Endrin aldehyde	UG/L	< 0.0236 U	---	---	---
Endrin ketone	UG/L	< 0.0236 U	---	---	---
gamma-BHC (Lindane)	UG/L	< 0.0236 U	---	---	---
Heptachlor	UG/L	< 0.0236 U	---	---	---
Heptachlor epoxide	UG/L	< 0.0236 U	---	---	---
Malathion	UG/L	< 0.94 U	---	---	---
Methoxychlor	UG/L	< 0.0236 U	---	---	---
Mevinphos	UG/L	< 0.94 U	---	---	---
Purgeable Petroleum Hydrocarbons					
GRO as Gasoline	UG/L	< 100 U	---	---	---
Semivolatile Organics					
1,2,4,5-Tetrachlorobenzene	UG/L	< 1 U	---	---	---
1,2-Dinitrobenzene	UG/L	< 5 U	---	---	---
1,2-Diphenylhydrazine	UG/L	< 1 U	---	---	---
1,3-Dimethyl adamatane	UG/L	< 5 U	---	---	---
1,3-Dinitrobenzene	UG/L	< 5 U	---	---	---
1,4-Dinitrobenzene	UG/L	< 5 U	---	---	---
1-Chloronaphthalene	UG/L	< 1 U	---	---	---
2,3,4,6-Tetrachlorophenol	UG/L	< 1 U	---	---	---
2,4,5-Trichlorophenol	UG/L	< 1 U	---	---	---
2,4,6-Trichlorophenol	UG/L	< 1 U	---	---	---
2,4-Dichlorophenol	UG/L	< 1 U	---	---	---
2,4-Dimethylphenol	UG/L	< 1 U	---	---	---
2,4-Dinitrophenol	UG/L	< 29 U	---	---	---
2,4-Dinitrotoluene	UG/L	< 5 U	---	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER I

Property Owner		PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I
Location Description		NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715
Source Type		WELL	WELL	WELL	WELL
Well Depth		203	203	203	203
Sampled Before Treatment?		Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment
Sample ID		1031201120201	1109201124303	1122201124301	1207201122202
Parameter and units	Sample Date	10/31/2011	11/9/2011	11/22/2011	12/7/2011
2,6-Dichlorophenol	UG/L	< 1 U	---	---	---
2,6-Dinitrotoluene	UG/L	< 1 U	---	---	---
2-Butoxyethanol	UG/L	< 5 UJ	---	---	---
2-Chloronaphthalene	UG/L	< 1 U	---	---	---
2-Chlorophenol	UG/L	< 1 U	---	---	---
2-Methylnaphthalene	UG/L	< 0.5 U	---	---	---
2-Methylphenol	UG/L	< 1 U	---	---	---
2-Nitroaniline	UG/L	< 1 U	---	---	---
2-Nitrophenol	UG/L	< 1 U	---	---	---
3,3-Dichlorobenzidine	UG/L	< 5 U	---	---	---
3-Nitroaniline	UG/L	< 1 U	---	---	---
4,4'-Methylenebis(2-chloroaniline)	UG/L	< 14 U	---	---	---
4,4'-Methylenebis(N,N-dimethylanilin	UG/L	< 14 UJ	---	---	---
4,6-Dinitro-2-methylphenol	UG/L	< 14 U	---	---	---
4-Bromophenyl phenyl ether	UG/L	< 1 U	---	---	---
4-Chloro-3-methylphenol	UG/L	< 1 U	---	---	---
4-Chloroaniline	UG/L	< 1 U	---	---	---
4-Chlorophenyl phenyl ether	UG/L	< 1 U	---	---	---
4-Methylphenol	UG/L	< 1 U	---	---	---
4-Nitroaniline	UG/L	< 1 UJ	---	---	---
4-Nitrophenol	UG/L	< 29 U	---	---	---
Acenaphthene	UG/L	< 0.5 U	---	---	---
Acenaphthylene	UG/L	< 0.5 U	---	---	---
Acetophenone	UG/L	< 1 U	---	---	---
Adamantane	UG/L	< 5 U	---	---	---
Aniline	UG/L	< 1 U	---	---	---
Anthracene	UG/L	< 0.5 U	---	---	---
Benzo (a) anthracene	UG/L	< 0.5 U	---	---	---
Benzo (a) pyrene	UG/L	< 0.5 U	---	---	---
Benzo (b) fluoranthene	UG/L	< 0.5 U	---	---	---
Benzo (g,h,i) perylene	UG/L	< 0.5 U	---	---	---
Benzo (k) fluoranthene	UG/L	< 0.5 U	---	---	---
Benzoic acid	UG/L	< 14 U	---	---	---
Benzyl alcohol	UG/L	< 14 U	---	---	---
Bis(2-chloroethoxy)methane	UG/L	< 1 U	---	---	---
Bis(2-chloroethyl)ether	UG/L	< 1 U	---	---	---
bis(2-Chloroisopropyl)ether	UG/L	< 1 U	---	---	---
Bis(2-ethylhexyl)phthalate	UG/L	< 5 U	---	---	---
Butyl benzyl phthalate	UG/L	< 5 U	---	---	---
Carbazole	UG/L	< 1 U	---	---	---
Chlorobenzilate	UG/L	< 10 U	---	---	---
Chrysene	UG/L	< 0.5 U	---	---	---
Diallate (cis or trans)	UG/L	< 5 U	---	---	---
Dibenz (a,h) anthracene	UG/L	< 0.5 U	---	---	---
Dibenzofuran	UG/L	< 1 U	---	---	---
Diethyl phthalate	UG/L	< 5 U	---	---	---
Dimethyl phthalate	UG/L	< 5 U	---	---	---
Di-n-butyl phthalate	UG/L	< 5 U	---	---	---
Di-n-octyl phthalate	UG/L	< 5 U	---	---	---
Dinoseb	UG/L	< 5 U	---	---	---
Disulfoton	UG/L	< 48 U	---	---	---
d-Limonene	UG/L	< 5 U	---	---	---
Fluoranthene	UG/L	< 0.5 U	---	---	---
Fluorene	UG/L	< 0.5 U	---	---	---
Hexachlorobenzene	UG/L	< 0.5 U	---	---	---
Hexachlorobutadiene	UG/L	< 1 U	---	---	---
Hexachlorocyclopentadiene	UG/L	< 14 U	---	---	---
Hexachloroethane	UG/L	< 5 U	---	---	---
Indeno (1,2,3-cd) pyrene	UG/L	< 0.5 U	---	---	---
Isophorone	UG/L	< 1 U	---	---	---
Naphthalene	UG/L	< 0.5 U	---	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER I

Property Owner		PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I
Location Description		NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715
Source Type		WELL	WELL	WELL	WELL
Well Depth		203	203	203	203
Sampled Before Treatment?		Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment
Sample ID		1031201120201	1109201124303	1122201124301	1207201122202
Parameter and units	Sample Date	10/31/2011	11/9/2011	11/22/2011	12/7/2011
Nitrobenzene	UG/L	< 1 U	---	---	---
N-Nitrosodiethylamine	UG/L	< 1 U	---	---	---
N-Nitrosodimethylamine	UG/L	< 5 U	---	---	---
N-Nitrosodi-n-butylamine	UG/L	< 5 U	---	---	---
N-Nitrosodi-n-propylamine	UG/L	< 1 U	---	---	---
N-Nitrosodiphenylamine	UG/L	< 1 U	---	---	---
N-Nitrosomethylethylamine	UG/L	< 5 U	---	---	---
Parathion-ethyl	UG/L	< 5 U	---	---	---
Parathion-methyl	UG/L	< 5 U	---	---	---
Pentachlorobenzene	UG/L	< 1 U	---	---	---
Pentachlorophenol	UG/L	< 5 UJ	---	---	---
Phenanthrene	UG/L	< 0.5 U	---	---	---
Phenol	UG/L	< 1 U	---	---	---
Phorate	UG/L	< 1 U	---	---	---
Pronamide	UG/L	< 1 U	---	---	---
Pyrene	UG/L	< 0.5 U	---	---	---
Pyridine	UG/L	< 5 U	---	---	---
Squalene	UG/L	< 5 UJ	---	---	---
Terbufos	UG/L	< 5 U	---	---	---
Terpineol	UG/L	< 5 U	---	---	---
Tributoxyethyl phosphate	UG/L	< 5 UJ	---	---	---
Trifluralin	UG/L	< 5 U	---	---	---
TICs					
1,2,3-Trimethylbenzene	UG/L	---	---	---	---
Volatile Organics					
1,1,1-Trichloroethane	UG/L	< 1.00 U	---	---	---
1,1,2-Trichloroethane	UG/L	< 1.00 U	---	---	---
1,1-Dichloroethane	UG/L	< 1.00 U	---	---	---
1,1-Dichloroethene	UG/L	< 1.00 U	---	---	---
1,2,3-Trimethylbenzene	UG/L	< 1.00 U	---	---	---
1,2,4-Trichlorobenzene	UG/L	---	---	---	---
1,2,4-Trimethylbenzene	UG/L	< 1.00 U	---	---	---
1,2-Dibromo-3-chloropropane	UG/L	< 0.1014 U	---	---	---
1,2-Dichlorobenzene	UG/L	< 1.00 U	---	---	---
1,2-Dichloroethane	UG/L	< 1.00 U	---	---	---
1,2-Dichloropropane	UG/L	---	---	---	---
1,3,5-Trimethylbenzene	UG/L	< 1.00 U	---	---	---
1,3-Dichlorobenzene	UG/L	< 1.00 U	---	---	---
1,4-Dichlorobenzene	UG/L	< 1.00 U	---	---	---
Acetone	UG/L	< 50.0 U	---	---	---
Benzene	UG/L	< 1.00 U	---	---	---
Carbon disulfide	UG/L	< 1.00 U	---	---	---
Carbon Tetrachloride	UG/L	< 1.00 U	---	---	---
Chlorobenzene	UG/L	< 1.00 U	---	---	---
Chloroform	UG/L	< 1.00 U	---	---	---
cis-1,2-Dichloroethene	UG/L	< 1.00 U	---	---	---
Diisopropyl Ether	UG/L	< 1.00 U	---	---	---
Ethanol	UG/L	< 100 U	---	---	---
Ethyl tert-Butyl Ether	UG/L	< 1.00 U	---	---	---
Ethylbenzene	UG/L	< 1.00 U	---	---	---
Hexachlorobutadiene	UG/L	< 1 U	---	---	---
Isopropyl alcohol	UG/L	< 50.0 U	---	---	---
Isopropylbenzene	UG/L	< 1.00 U	---	---	---
m,p-Xylene	UG/L	< 2.00 U	---	---	---
Methoxychlor	UG/L	< 0.0236 U	---	---	---
Methyl tert-Butyl Ether	UG/L	< 1.00 U	---	---	---
Methylene Chloride	UG/L	< 5.00 U	---	---	---
Naphthalene	UG/L	< 5.00 U	---	---	---
o-Xylene	UG/L	< 1.00 U	---	---	---
Styrene	UG/L	---	---	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER I

	Property Owner	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I	PROPERTY OWNER I
	Location Description	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715	NEW WELL-SAMPLE TAKEN AT 1715
	Source Type	WELL	WELL	WELL	WELL
	Well Depth	203	203	203	203
	Sampled Before Treatment?	Pre-Treatment	Pre-Treatment	Pre-Treatment	Pre-Treatment
	Sample ID	1031201120201	1109201124303	1122201124301	1207201122202
Parameter and units	Sample Date	10/31/2011	11/9/2011	11/22/2011	12/7/2011
Tert-Amyl Methyl Ether	UG/L	< 1.00 U	---	---	---
Tertiary Butyl Alcohol	UG/L	< 10.0 U	---	---	---
Tetrachloroethene	UG/L	< 1.00 U	---	---	---
Tetrahydrofuran	UG/L	---	---	---	---
Toluene	UG/L	< 1.00 U	---	---	---
trans-1,2-Dichloroethene	UG/L	< 1.00 U	---	---	---
Trichloroethene	UG/L	< 1.00 U	---	---	---
Vinyl chloride	UG/L	< 1.00 U	---	---	---
Xylenes, total	UG/L	< 3.00 U	---	---	---

Notes:
U : Parameter not detected at posted limit
< : Parameter not detected at posted limit
ND : Parameter not detected
H : Parameter analyzed beyond method recommended holding time
J : Estimated value
--- : Parameter not analyzed.
B : Blank qualified
ug/L : Micrograms per liter
mg/L : Milligrams per liter
NA : Not Available
NTU : Nephelometric Turbidity Unit
umho/cm : Micromhos per centimeter
colonies/100 ml : Colonies per 100 millileters

APPENDIX A-10
EPA STUDY WELL DATA
PROPERTY OWNER J

SUMMARY TABLE OF ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER J

Property Owner		PROPERTY OWNER J	PROPERTY OWNER J	PROPERTY OWNER J
Location Description			WELL LOCATED 5 FEET WEST OF PORCH; NO HOT WATER	WELL LOCATED 5 FEET WEST OF PORCH; NO HOT WATER
Source Type		WELL	WELL	WELL
Well Depth		UNKNOWN	UNKNOWN	UNKNOWN
Sampled Before Treatment?		NA	Pre-Treatment	Pre-Treatment
Sample ID		NTG0332-PROPERTY OWNER J-001	0208201112301	1103201120202
Parameter and units	Sample Date	7/2/2010 (Baseline)	2/8/2011	11/3/2011
Aldehydes				
Gluteraldehyde	UG/L	---	---	---
Bacteria				
E. coli	colonies/100ml	---	---	Absent
Fecal coliform bacteria	colonies/100ml	---	---	< 1 U
Total Coliform Bacteria	colonies/100ml	---	---	Absent
DBCP				
1,2-Dibromo-3-chloropropane	UG/L	---	---	< 0.1026 U
Extractable Petroleum Hydrocarbons				
Diesel	UG/L	---	---	< 94.3 U
General Chemistry				
Alkalinity, Total (CaCO3)	MG/L	---	---	211
Ammonia as N	MG/L	---	---	< 0.100 U
Bicarbonate Alkalinity as CaCO3	MG/L	247	217	224
Bromide	MG/L	---	---	< 2.5 U
Carbonate as CaCO3	MG/L	ND	< 10.0 U	< 10.0 U
Chloride	MG/L	37.9	< 5.00 U	2.2 J
CO2 by Headspace	UG/L	---	---	< 12000 U
Cyanide	MG/L	---	---	---
Fluoride	MG/L	---	---	< 0.50 U
MBAS	MG/L	ND	< 0.0500 U	< 0.12 U
Nitrate	MG/L	---	---	---
Nitrate Nitrogen	MG/L	---	---	< 0.50 U
Nitrite Nitrogen	MG/L	---	---	< 0.50 U
Oil & Grease HEM	MG/L	ND	< 5.95 U	< 5.00 U
pH	pH UNITS	7.40 HTI	7.80 H	7.40 H
Phosphorus	MG/L	---	---	< 0.100 U
Specific conductance	UMHO/CM	590	505	460
Sulfate	MG/L	38.2	36.8	42.2
Temperature of pH determination	CELSIUS	22.2 HTI	21.7 H	21.0 H
Total Dissolved Solids	MG/L	336	259	269
Total Suspended Solids	MG/L	1.5	2.2	3.5
Turbidity	NTU	5.7	9.8	5
Glycols				
1,2-Propylene Glycol	MG/L	---	---	---
Diethylene Glycol	MG/L	---	---	< 10 U
Ethylene Glycol	MG/L	---	---	---
Tetraethylene glycol	MG/L	---	---	< 10 UJ
Triethylene glycol	MG/L	---	---	< 10 U
Light Gases				
Acetylene	MG/L	---	---	< 0.00500 U
Ethane	MG/L	ND	< 0.0260 U	< 0.00500 U
Ethene	MG/L	---	---	< 0.00500 U
Methane	MG/L	ND	< 0.0260 U	< 0.00500 U
n-Butane	MG/L	---	---	< 0.00500 U
Propane	MG/L	ND	< 0.0340 U	< 0.00500 U
Low Molecular Weight Acids				
Acetic Acid	UG/L	---	---	< 10000 U
Butyric Acid	UG/L	---	---	< 10000 U
Formic Acid	UG/L	---	---	< 10000 U
Isobutyric acid	UG/L	---	---	< 10000 U
Lactic acid	UG/L	---	---	< 5000 U
Propionic Acid	UG/L	---	---	< 13000 U

SUMMARY TABLE OF ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER J

Property Owner		PROPERTY OWNER J	PROPERTY OWNER J	PROPERTY OWNER J
Location Description			WELL LOCATED 5 FEET WEST OF PORCH; NO HOT WATER	WELL LOCATED 5 FEET WEST OF PORCH; NO HOT WATER
Source Type		WELL	WELL	WELL
Well Depth		UNKNOWN	UNKNOWN	UNKNOWN
Sampled Before Treatment?		NA	Pre-Treatment	Pre-Treatment
Sample ID		NTG0332-PROPERTY OWNER J-001	0208201112301	1103201120202
Parameter and units	Sample Date	7/2/2010 (Baseline)	2/8/2011	11/3/2011
Metals, 6020x				
Cesium	MG/L	---	---	< 0.0001 U
Cesium, Dissolved	MG/L	---	---	< 0.0001 U
Potassium	MG/L	---	---	1.2
Potassium, Dissolved	MG/L	---	---	1.3
Silicon	MG/L	---	---	5.5
Silicon, Dissolved	MG/L	---	---	5.5
Thorium	MG/L	---	---	< 0.002 U
Thorium, Dissolved	MG/L	---	---	< 0.002 U
Uranium	MG/L	---	---	0.0032
Uranium, Dissolved	MG/L	---	---	0.0031
Metals, Total				
Aluminum	MG/L	---	---	< 0.0200 U
Antimony	MG/L	---	---	< 0.00200 U
Arsenic	MG/L	ND	< 0.0100 U	< 0.00200 U
Barium	MG/L	0.0651	0.068	0.0673
Beryllium	MG/L	---	---	< 0.00200 U
Boron	MG/L	---	---	0.055
Cadmium	MG/L	ND	< 0.00100 U	< 0.00100 U
Calcium	MG/L	53.8	55.5	55.4
Chromium	MG/L	ND	< 0.00500 U	< 0.00200 U
Cobalt	MG/L	---	---	< 0.00200 U
Copper	MG/L	---	---	< 0.00500 U
Hardness, CaCO3	MG/L	---	---	---
Iron	MG/L	0.676	0.888	0.583
Lead	MG/L	0.0114	0.009	< 0.00200 U
Lithium	MG/L	---	---	---
Magnesium	MG/L	14.3	15.6	15.2
Manganese	MG/L	0.249	0.29	0.22
Mercury	MG/L	ND	< 0.000200 U	< 0.000200 U
Molybdenum	MG/L	---	---	< 0.00500 U
Nickel	MG/L	---	---	< 0.00500 U
Potassium	MG/L	1.13	1.17	1.17
Selenium	MG/L	ND	< 0.0100 U	< 0.00200 U
Silver	MG/L	ND	< 0.00500 U	< 0.00200 U
Sodium	MG/L	39	22.6	22.8
Strontium	MG/L	---	---	0.575
Sulfur	MG/L	13	11.6	12
Thallium	MG/L	---	---	< 0.00200 U
Titanium	MG/L	---	---	< 0.00200 U
Vanadium	MG/L	---	---	< 0.00400 U
Zinc	MG/L	---	---	0.237
Metals, Dissolved				
Aluminum, Dissolved	MG/L	---	---	< 0.0200 U
Antimony, Dissolved	MG/L	---	---	< 0.00200 U
Arsenic, Dissolved	MG/L	---	---	< 0.00200 U
Barium, Dissolved	MG/L	---	---	0.0649
Beryllium, Dissolved	MG/L	---	---	< 0.00200 U
Boron, Dissolved	MG/L	---	---	0.0575
Cadmium, Dissolved	MG/L	---	---	< 0.00100 U
Calcium, Dissolved	MG/L	---	---	59.4
Chromium, Dissolved	MG/L	---	---	< 0.00200 U
Cobalt, Dissolved	MG/L	---	---	< 0.00200 U
Copper, Dissolved	MG/L	---	---	< 0.00500 U
Iron, Dissolved	MG/L	---	---	0.316
Lead, Dissolved	MG/L	---	---	< 0.00200 U
Magnesium, Dissolved	MG/L	---	---	16.2

SUMMARY TABLE OF ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER J

Property Owner		PROPERTY OWNER J	PROPERTY OWNER J	PROPERTY OWNER J
Location Description			WELL LOCATED 5 FEET WEST OF PORCH; NO HOT WATER	WELL LOCATED 5 FEET WEST OF PORCH; NO HOT WATER
Source Type		WELL	WELL	WELL
Well Depth		UNKNOWN	UNKNOWN	UNKNOWN
Sampled Before Treatment?		NA	Pre-Treatment	Pre-Treatment
Sample ID		NTG0332-PROPERTY OWNER J-001	0208201112301	1103201120202
Parameter and units	Sample Date	7/2/2010 (Baseline)	2/8/2011	11/3/2011
Manganese, Dissolved	MG/L	---	---	0.216
Mercury, Dissolved	MG/L	---	---	< 0.000200 U
Molybdenum, Dissolved	MG/L	---	---	< 0.00500 U
Nickel, Dissolved	MG/L	---	---	< 0.00500 U
Potassium, Dissolved	MG/L	---	---	1.35
Selenium, Dissolved	MG/L	---	---	< 0.00200 U
Silver, Dissolved	MG/L	---	---	< 0.00200 U
Sodium, Dissolved	MG/L	---	---	26.2
Strontium, Dissolved	MG/L	---	---	0.623
Sulfur, Dissolved	MG/L	---	---	13
Thallium, Dissolved	MG/L	---	---	< 0.00200 U
Titanium, Dissolved	MG/L	---	---	< 0.00200 U
Vanadium, Dissolved	MG/L	---	---	< 0.00400 U
Zinc, Dissolved	MG/L	---	---	0.0592
Miscellaneous Organics				
Inorganic Carbon, Dissolved	MG/L	---	---	46.9
Organic Carbon, Dissolved	MG/L	---	---	< 1.00 U
Pesticides and PCBs				
4,4'-DDD	UG/L	---	---	< 0.0236 U
4,4'-DDE	UG/L	---	---	< 0.0236 U
4,4'-DDT	UG/L	---	---	< 0.0236 U
Aldrin	UG/L	---	---	< 0.0236 U
alpha-BHC	UG/L	---	---	< 0.0236 U
Azinphos-methyl	UG/L	---	---	< 0.94 U
beta-BHC	UG/L	---	---	< 0.0236 U
Carbaryl	UG/L	---	---	< 6.0 U
delta-BHC	UG/L	---	---	< 0.0236 U
Dichlorvos	UG/L	---	---	< 0.94 U
Dieldrin	UG/L	---	---	< 0.0236 U
Disulfoton	UG/L	---	---	< 0.94 U
Endosulfan I	UG/L	---	---	< 0.0236 U
Endosulfan II	UG/L	---	---	< 0.0236 U
Endosulfan sulfate	UG/L	---	---	< 0.0236 U
Endrin	UG/L	---	---	< 0.0236 U
Endrin aldehyde	UG/L	---	---	< 0.0236 U
Endrin ketone	UG/L	---	---	< 0.0236 U
gamma-BHC (Lindane)	UG/L	---	---	< 0.0236 U
Heptachlor	UG/L	---	---	< 0.0236 U
Heptachlor epoxide	UG/L	---	---	< 0.0236 U
Malathion	UG/L	---	---	< 0.94 U
Methoxychlor	UG/L	---	---	< 0.0236 U
Mevinphos	UG/L	---	---	< 0.94 U
Purgeable Petroleum Hydrocarbons				
GRO as Gasoline	UG/L	---	---	< 100 U
Semivolatile Organics				
1,2,4,5-Tetrachlorobenzene	UG/L	---	---	< 0.9 U
1,2-Dinitrobenzene	UG/L	---	---	< 5 U
1,2-Diphenylhydrazine	UG/L	---	---	< 0.9 U
1,3-Dimethyl adamatane	UG/L	---	---	< 5 U
1,3-Dinitrobenzene	UG/L	---	---	< 5 U
1,4-Dinitrobenzene	UG/L	---	---	< 5 U
1-Chloronaphthalene	UG/L	---	---	< 0.9 U
2,3,4,6-Tetrachlorophenol	UG/L	---	---	< 0.9 U
2,4,5-Trichlorophenol	UG/L	---	---	< 0.9 U
2,4,6-Trichlorophenol	UG/L	---	---	< 0.9 U
2,4-Dichlorophenol	UG/L	---	---	< 0.9 U
2,4-Dimethylphenol	UG/L	---	---	< 0.9 U
2,4-Dinitrophenol	UG/L	---	---	< 28 U
2,4-Dinitrotoluene	UG/L	---	---	< 5 U

SUMMARY TABLE OF ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER J

Property Owner		PROPERTY OWNER J	PROPERTY OWNER J	PROPERTY OWNER J
Location Description			WELL LOCATED 5 FEET WEST OF PORCH; NO HOT WATER	WELL LOCATED 5 FEET WEST OF PORCH; NO HOT WATER
Source Type		WELL	WELL	WELL
Well Depth		UNKNOWN	UNKNOWN	UNKNOWN
Sampled Before Treatment?		NA	Pre-Treatment	Pre-Treatment
Sample ID		NTG0332-PROPERTY OWNER J-001	0208201112301	1103201120202
Parameter and units	Sample Date	7/2/2010 (Baseline)	2/8/2011	11/3/2011
2,6-Dichlorophenol	UG/L	---	---	< 0.9 U
2,6-Dinitrotoluene	UG/L	---	---	< 0.9 U
2-Butoxyethanol	UG/L	---	---	< 5 UJ
2-Chloronaphthalene	UG/L	---	---	< 0.9 U
2-Chlorophenol	UG/L	---	---	< 0.9 U
2-Methylnaphthalene	UG/L	---	---	< 0.5 U
2-Methylphenol	UG/L	---	---	< 0.9 U
2-Nitroaniline	UG/L	---	---	< 0.9 U
2-Nitrophenol	UG/L	---	---	< 0.9 U
3,3-Dichlorobenzidine	UG/L	---	---	< 5 U
3-Nitroaniline	UG/L	---	---	< 0.9 U
4,4'-Methylenebis(2-chloroaniline)	UG/L	---	---	< 14 UJ
4,4'-Methylenebis(N,N-dimethylanilir	UG/L	---	---	< 14 UJ
4,6-Dinitro-2-methylphenol	UG/L	---	---	< 14 U
4-Bromophenyl phenyl ether	UG/L	---	---	< 0.9 U
4-Chloro-3-methylphenol	UG/L	---	---	< 0.9 UJ
4-Chloroaniline	UG/L	---	---	< 0.9 U
4-Chlorophenyl phenyl ether	UG/L	---	---	< 0.9 U
4-Methylphenol	UG/L	---	---	< 0.9 U
4-Nitroaniline	UG/L	---	---	< 0.9 U
4-Nitrophenol	UG/L	---	---	< 28 U
Acenaphthene	UG/L	---	---	< 0.5 U
Acenaphthylene	UG/L	---	---	< 0.5 U
Acetophenone	UG/L	---	---	< 0.9 U
Adamantane	UG/L	---	---	< 5 U
Aniline	UG/L	---	---	< 0.9 U
Anthracene	UG/L	---	---	< 0.5 U
Benzo (a) anthracene	UG/L	---	---	< 0.5 UJ
Benzo (a) pyrene	UG/L	---	---	< 0.5 U
Benzo (b) fluoranthene	UG/L	---	---	< 0.5 U
Benzo (g,h,i) perylene	UG/L	---	---	< 0.5 U
Benzo (k) fluoranthene	UG/L	---	---	< 0.5 U
Benzoic acid	UG/L	---	---	< 14 UJ
Benzyl alcohol	UG/L	---	---	< 14 U
Bis(2-chloroethoxy)methane	UG/L	---	---	< 0.9 U
Bis(2-chloroethyl)ether	UG/L	---	---	< 0.9 U
bis(2-Chloroisopropyl)ether	UG/L	---	---	< 0.9 U
Bis(2-ethylhexyl)phthalate	UG/L	---	---	< 5 UJ
Butyl benzyl phthalate	UG/L	---	---	< 5 UJ
Carbazole	UG/L	---	---	< 0.9 U
Chlorobenzilate	UG/L	---	---	< 9 U
Chrysene	UG/L	---	---	< 0.5 UJ
Diallate (cis or trans)	UG/L	---	---	< 5 U
Dibenz (a,h) anthracene	UG/L	---	---	< 0.5 U
Dibenzofuran	UG/L	---	---	< 0.9 U
Diethyl phthalate	UG/L	---	---	< 5 U
Dimethyl phthalate	UG/L	---	---	< 5 U
Di-n-butyl phthalate	UG/L	---	---	< 5 U
Di-n-octyl phthalate	UG/L	---	---	< 5 U
Dinoseb	UG/L	---	---	< 5 U
Disulfoton	UG/L	---	---	< 47 U
d-Limonene	UG/L	---	---	< 5 U
Fluoranthene	UG/L	---	---	< 0.5 U
Fluorene	UG/L	---	---	< 0.5 U
Hexachlorobenzene	UG/L	---	---	< 0.5 U
Hexachlorobutadiene	UG/L	---	---	< 0.9 U
Hexachlorocyclopentadiene	UG/L	---	---	< 14 U
Hexachloroethane	UG/L	---	---	< 5 U
Indeno (1,2,3-cd) pyrene	UG/L	---	---	< 0.5 U
Isophorone	UG/L	---	---	< 0.9 U
Naphthalene	UG/L	---	---	< 0.5 U

SUMMARY TABLE OF ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER J

Property Owner		PROPERTY OWNER J	PROPERTY OWNER J	PROPERTY OWNER J
Location Description			WELL LOCATED 5 FEET WEST OF PORCH; NO HOT WATER	WELL LOCATED 5 FEET WEST OF PORCH; NO HOT WATER
Source Type		WELL	WELL	WELL
Well Depth		UNKNOWN	UNKNOWN	UNKNOWN
Sampled Before Treatment?		NA	Pre-Treatment	Pre-Treatment
Sample ID		NTG0332-PROPERTY OWNER J-001	0208201112301	1103201120202
Parameter and units	Sample Date	7/2/2010 (Baseline)	2/8/2011	11/3/2011
Nitrobenzene	UG/L	---	---	< 0.9 U
N-Nitrosodiethylamine	UG/L	---	---	< 0.9 U
N-Nitrosodimethylamine	UG/L	---	---	< 5 U
N-Nitrosodi-n-butylamine	UG/L	---	---	< 5 U
N-Nitrosodi-n-propylamine	UG/L	---	---	< 0.9 U
N-Nitrosodiphenylamine	UG/L	---	---	< 0.9 U
N-Nitrosomethylethylamine	UG/L	---	---	< 5 U
Parathion-ethyl	UG/L	---	---	< 5 U
Parathion-methyl	UG/L	---	---	< 5 U
Pentachlorobenzene	UG/L	---	---	< 0.9 U
Pentachlorophenol	UG/L	---	---	< 5 U
Phenanthrene	UG/L	---	---	< 0.5 U
Phenol	UG/L	---	---	< 0.9 U
Phorate	UG/L	---	---	< 0.9 U
Pronamide	UG/L	---	---	< 0.9 U
Pyrene	UG/L	---	---	< 0.5 U
Pyridine	UG/L	---	---	< 5 U
Squalene	UG/L	---	---	< 5 UJ
Terbufos	UG/L	---	---	< 5 UJ
Terpineol	UG/L	---	---	< 5 U
Tributoxyethyl phosphate	UG/L	---	---	< 5 U
Trifluralin	UG/L	---	---	< 5 UJ
TICs				
1,2,3-Trimethylbenzene	UG/L	---	---	---
Volatile Organics				
1,1,1-Trichloroethane	UG/L	---	---	< 1.00 U
1,1,2-Trichloroethane	UG/L	---	---	< 1.00 U
1,1-Dichloroethane	UG/L	---	---	< 1.00 U
1,1-Dichloroethene	UG/L	---	---	< 1.00 U
1,2,3-Trimethylbenzene	UG/L	---	---	< 1.00 U
1,2,4-Trichlorobenzene	UG/L	---	---	---
1,2,4-Trimethylbenzene	UG/L	---	---	< 1.00 U
1,2-Dibromo-3-chloropropane	UG/L	---	---	< 0.1026 U
1,2-Dichlorobenzene	UG/L	---	---	< 1.00 U
1,2-Dichloroethane	UG/L	---	---	< 1.00 U
1,2-Dichloropropane	UG/L	---	---	---
1,3,5-Trimethylbenzene	UG/L	---	---	< 1.00 U
1,3-Dichlorobenzene	UG/L	---	---	< 1.00 U
1,4-Dichlorobenzene	UG/L	---	---	< 1.00 U
Acetone	UG/L	---	---	< 50.0 U
Benzene	UG/L	ND	< 0.500 U	< 1.00 U
Carbon disulfide	UG/L	---	---	< 1.00 U
Carbon Tetrachloride	UG/L	---	---	< 1.00 U
Chlorobenzene	UG/L	---	---	< 1.00 U
Chloroform	UG/L	---	---	< 1.00 U
cis-1,2-Dichloroethene	UG/L	---	---	< 1.00 U
Diisopropyl Ether	UG/L	---	---	< 1.00 U
Ethanol	UG/L	---	---	< 100 U
Ethyl tert-Butyl Ether	UG/L	---	---	< 1.00 U
Ethylbenzene	UG/L	ND	< 0.500 U	< 1.00 U
Hexachlorobutadiene	UG/L	---	---	< 0.9 U
Isopropyl alcohol	UG/L	---	---	< 50.0 U
Isopropylbenzene	UG/L	---	---	< 1.00 U
m,p-Xylene	UG/L	---	---	< 2.00 U
Methoxychlor	UG/L	---	---	< 0.0236 U
Methyl tert-Butyl Ether	UG/L	---	---	< 1.00 U
Methylene Chloride	UG/L	---	---	< 5.00 U
Naphthalene	UG/L	---	---	< 5.00 U
o-Xylene	UG/L	---	---	< 1.00 U
Styrene	UG/L	---	---	---

SUMMARY TABLE OF ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER J

	Property Owner	PROPERTY OWNER J	PROPERTY OWNER J	PROPERTY OWNER J
	Location Description		WELL LOCATED 5 FEET WEST OF PORCH; NO HOT WATER	WELL LOCATED 5 FEET WEST OF PORCH; NO HOT WATER
	Source Type	WELL	WELL	WELL
	Well Depth	UNKNOWN	UNKNOWN	UNKNOWN
	Sampled Before Treatment?	NA	Pre-Treatment	Pre-Treatment
	Sample ID	NTG0332-PROPERTY OWNER J-001	0208201112301	1103201120202
Parameter and units	Sample Date	7/2/2010 (Baseline)	2/8/2011	11/3/2011
Tert-Amyl Methyl Ether	UG/L	---	---	< 1.00 U
Tertiary Butyl Alcohol	UG/L	---	---	< 10.0 U
Tetrachloroethene	UG/L	---	---	< 1.00 U
Tetrahydrofuran	UG/L	---	---	---
Toluene	UG/L	ND	< 0.500 U	< 1.00 U
trans-1,2-Dichloroethene	UG/L	---	---	< 1.00 U
Trichloroethene	UG/L	---	---	< 1.00 U
Vinyl chloride	UG/L	---	---	< 1.00 U
Xylenes, total	UG/L	ND	< 0.500 U	< 3.00 U

Notes:

U : Parameter not detected at posted limit
< : Parameter not detected at posted limit
ND : Parameter not detected
H : Parameter analyzed beyond method recommended holding time
J : Estimated value
--- : Parameter not analyzed.
B : Blank qualified
ug/L : Micrograms per liter
mg/L : Milligrams per liter
NA : Not Available
NTU : Nephelometric Turbidity Unit
umho/cm : Micromhos per centimeter
colonies/100 ml : Colonies per 100 millileters

APPENDIX A-11
EPA STUDY WELL DATA
PROPERTY OWNER K

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER K

Property Owner		PROPERTY OWNER K	PROPERTY OWNER K	PROPERTY OWNER K
Location Description		THE WELL IS LOCATED ON THE SOUTH SIDE OF THE MILK HOUSE; IT FEEDS BOTH THE MILK HOUSE AND THE RESIDENCE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE MILK HOUSE; IT FEEDS BOTH THE MILK HOUSE AND THE RESIDENCE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE MILK HOUSE; IT FEEDS BOTH THE MILK HOUSE AND THE RESIDENCE.
Source Type		WELL	WELL	WELL
Well Depth		175	175	175
Sampled Before Treatment?		NA	Post-Treatment	Pre-Treatment
Sample ID		NTA0354-01072010-0855	0531201120201	1027201120202
Parameter and units	Sample Date	1/7/2010 (Baseline)	5/31/2011	10/27/2011
Aldehydes				
Gluteraldehyde	UG/L	---	---	---
Bacteria				
E. coli	colonies/100ml	---	---	Absent
Fecal coliform bacteria	colonies/100ml	---	---	< 1 U
Total Coliform Bacteria	colonies/100ml	---	---	Present
DBCP				
1,2-Dibromo-3-chloropropane	UG/L	---	---	< 0.1003 U
Extractable Petroleum Hydrocarbons				
Diesel	UG/L	---	---	< 94.3 U
General Chemistry				
Alkalinity, Total (CaCO3)	MG/L	---	---	194
Ammonia as N	MG/L	---	---	0.107
Bicarbonate Alkalinity as CaCO3	MG/L	194	188	189
Bromide	MG/L	---	---	< 2.5 U
Carbonate as CaCO3	MG/L	< 10.0 U	< 10.0 U	< 10.0 U
Chloride	MG/L	4.57	6.13	4.8
CO2 by Headspace	UG/L	---	---	< 12000 U
Cyanide	MG/L	---	---	---
Fluoride	MG/L	---	---	< 0.50 U
MBAS	MG/L	< 0.0500 U	< 0.0500 U	< 0.12 U
Nitrate	MG/L	---	---	---
Nitrate Nitrogen	MG/L	---	---	< 0.50 U
Nitrite Nitrogen	MG/L	---	---	< 0.50 U
Oil & Grease HEM	MG/L	< 5.43 U	< 5.95 U	< 4.94 U
pH	pH UNITS	7.10 H	7.70 H	7.60 H
Phosphorus	MG/L	---	---	< 0.100 U
Specific conductance	UMHO/CM	400	411	389
Sulfate	MG/L	17.6	19.8	20.7 J
Temperature of pH determination	CELSIUS	21.7 H	21.8 H	21.0 H
Total Dissolved Solids	MG/L	225	223	215
Total Suspended Solids	MG/L	< 1.00 U	1.1	1.7
Turbidity	NTU	< 1.00 U	< 1.00 U	0.48
Glycols				
1,2-Propylene Glycol	MG/L	---	---	---
Diethylene Glycol	MG/L	---	---	< 10 U
Ethylene Glycol	MG/L	---	---	---
Tetraethylene glycol	MG/L	---	---	< 10 UJ
Triethylene glycol	MG/L	---	---	< 10 U
Light Gases				
Acetylene	MG/L	---	---	< 0.00500 U
Ethane	MG/L	< 0.0260 U	< 0.0260 U	< 0.00500 U
Ethene	MG/L	---	---	< 0.00500 U
Methane	MG/L	< 0.0260 U	< 0.0260 U	0.00674
n-Butane	MG/L	---	---	< 0.00500 U
Propane	MG/L	< 0.0340 U	< 0.0340 U	< 0.00500 U
Low Molecular Weight Acids				
Acetic Acid	UG/L	---	---	< 10000 U
Butyric Acid	UG/L	---	---	< 10000 U
Formic Acid	UG/L	---	---	< 10000 U
Isobutyric acid	UG/L	---	---	< 10000 U
Lactic acid	UG/L	---	---	< 5000 U
Propionic Acid	UG/L	---	---	< 13000 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER K

Property Owner		PROPERTY OWNER K	PROPERTY OWNER K	PROPERTY OWNER K
Location Description		THE WELL IS LOCATED ON THE SOUTH SIDE OF THE MILK HOUSE; IT FEEDS BOTH THE MILK HOUSE AND THE RESIDENCE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE MILK HOUSE; IT FEEDS BOTH THE MILK HOUSE AND THE RESIDENCE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE MILK HOUSE; IT FEEDS BOTH THE MILK HOUSE AND THE RESIDENCE.
Source Type		WELL	WELL	WELL
Well Depth		175	175	175
Sampled Before Treatment?		NA	Post-Treatment	Pre-Treatment
Sample ID		NTA0354-01072010-0855	0531201120201	1027201120202
Parameter and units	Sample Date	1/7/2010 (Baseline)	5/31/2011	10/27/2011
Metals, 6020x				
Cesium	MG/L	---	---	0.00014
Cesium, Dissolved	MG/L	---	---	0.00011
Potassium	MG/L	---	---	1.45
Potassium, Dissolved	MG/L	---	---	1.5
Silicon	MG/L	---	---	6.22
Silicon, Dissolved	MG/L	---	---	6.42
Thorium	MG/L	---	---	< 0.002 U
Thorium, Dissolved	MG/L	---	---	< 0.002 U
Uranium	MG/L	---	---	< 0.001 U
Uranium, Dissolved	MG/L	---	---	< 0.001 U
Metals, Total				
Aluminum	MG/L	---	---	< 0.0200 U
Antimony	MG/L	---	---	< 0.00200 U
Arsenic	MG/L	< 0.0100 U	< 0.0100 U	< 0.00200 U
Barium	MG/L	0.111	0.126	0.125
Beryllium	MG/L	---	---	< 0.00200 U
Boron	MG/L	---	---	0.0941
Cadmium	MG/L	< 0.00100 U	< 0.00100 U	< 0.00100 U
Calcium	MG/L	36.9	40	41.6
Chromium	MG/L	< 0.00500 U	< 0.00500 U	< 0.00200 U
Cobalt	MG/L	---	---	< 0.00200 U
Copper	MG/L	---	---	< 0.00500 U
Hardness, CaCO3	MG/L	---	---	---
Iron	MG/L	< 0.0500 U	< 0.0500 U	0.0514
Lead	MG/L	< 0.00500 U	< 0.00500 U	< 0.00200 U
Lithium	MG/L	---	---	---
Magnesium	MG/L	14.1	15	15.3
Manganese	MG/L	0.0321	0.102	0.168
Mercury	MG/L	< 0.000200 U	< 0.000200 U	< 0.000200 U
Molybdenum	MG/L	---	---	< 0.00500 U
Nickel	MG/L	---	---	< 0.00500 U
Potassium	MG/L	1.46	1.39	1.46
Selenium	MG/L	< 0.0100 U	< 0.0100 U	< 0.00200 U
Silver	MG/L	< 0.00500 U	< 0.00500 U	< 0.00200 U
Sodium	MG/L	20.2	22.8	21.1
Strontium	MG/L	---	---	1.14
Sulfur	MG/L	8.04	5.3	5.43
Thallium	MG/L	---	---	< 0.00200 U
Titanium	MG/L	---	---	< 0.00200 U
Vanadium	MG/L	---	---	< 0.00400 U
Zinc	MG/L	---	---	< 0.0500 U
Metals, Dissolved				
Aluminum, Dissolved	MG/L	---	---	< 0.0200 U
Antimony, Dissolved	MG/L	---	---	< 0.00200 U
Arsenic, Dissolved	MG/L	---	---	< 0.00200 U
Barium, Dissolved	MG/L	---	---	0.124
Beryllium, Dissolved	MG/L	---	---	< 0.00200 U
Boron, Dissolved	MG/L	---	---	0.09
Cadmium, Dissolved	MG/L	---	---	< 0.00100 U
Calcium, Dissolved	MG/L	---	---	39.9
Chromium, Dissolved	MG/L	---	---	< 0.00200 U
Cobalt, Dissolved	MG/L	---	---	< 0.00200 U
Copper, Dissolved	MG/L	---	---	< 0.00500 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER K

Property Owner		PROPERTY OWNER K	PROPERTY OWNER K	PROPERTY OWNER K
Location Description		THE WELL IS LOCATED ON THE SOUTH SIDE OF THE MILK HOUSE; IT FEEDS BOTH THE MILK HOUSE AND THE RESIDENCE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE MILK HOUSE; IT FEEDS BOTH THE MILK HOUSE AND THE RESIDENCE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE MILK HOUSE; IT FEEDS BOTH THE MILK HOUSE AND THE RESIDENCE.
Source Type		WELL	WELL	WELL
Well Depth		175	175	175
Sampled Before Treatment?		NA	Post-Treatment	Pre-Treatment
Sample ID		NTA0354-01072010-0855	0531201120201	1027201120202
Parameter and units	Sample Date	1/7/2010 (Baseline)	5/31/2011	10/27/2011
Iron, Dissolved	MG/L	---	---	< 0.0500 U
Lead, Dissolved	MG/L	---	---	< 0.00200 U
Magnesium, Dissolved	MG/L	---	---	14.6
Manganese, Dissolved	MG/L	---	---	0.119
Mercury, Dissolved	MG/L	---	---	< 0.000200 U
Molybdenum, Dissolved	MG/L	---	---	< 0.00500 U
Nickel, Dissolved	MG/L	---	---	< 0.00500 U
Potassium, Dissolved	MG/L	---	---	1.41
Selenium, Dissolved	MG/L	---	---	< 0.00200 U
Silver, Dissolved	MG/L	---	---	< 0.00200 U
Sodium, Dissolved	MG/L	---	---	19.9
Strontium, Dissolved	MG/L	---	---	1.11
Sulfur, Dissolved	MG/L	---	---	5.36
Thallium, Dissolved	MG/L	---	---	< 0.00200 U
Titanium, Dissolved	MG/L	---	---	< 0.00200 U
Vanadium, Dissolved	MG/L	---	---	< 0.00400 U
Zinc, Dissolved	MG/L	---	---	< 0.0500 U
Miscellaneous Organics				
Inorganic Carbon, Dissolved	MG/L	---	---	43.7
Organic Carbon, Dissolved	MG/L	---	---	< 1.00 U
Pesticides and PCBs				
4,4'-DDD	UG/L	---	---	< 0.0472 U
4,4'-DDE	UG/L	---	---	< 0.0472 U
4,4'-DDT	UG/L	---	---	< 0.0472 U
Aldrin	UG/L	---	---	< 0.0472 U
alpha-BHC	UG/L	---	---	< 0.0472 U
Azinphos-methyl	UG/L	---	---	< 0.94 U
beta-BHC	UG/L	---	---	< 0.0472 U
Carbaryl	UG/L	---	---	< 6.0 U
delta-BHC	UG/L	---	---	< 0.0472 U
Dichlorvos	UG/L	---	---	< 0.94 U
Dieldrin	UG/L	---	---	< 0.0472 U
Disulfoton	UG/L	---	---	< 0.94 U
Endosulfan I	UG/L	---	---	< 0.0472 U
Endosulfan II	UG/L	---	---	< 0.0472 U
Endosulfan sulfate	UG/L	---	---	< 0.0472 U
Endrin	UG/L	---	---	< 0.0472 U
Endrin aldehyde	UG/L	---	---	< 0.0472 U
Endrin ketone	UG/L	---	---	< 0.0472 U
gamma-BHC (Lindane)	UG/L	---	---	< 0.0472 U
Heptachlor	UG/L	---	---	< 0.0472 U
Heptachlor epoxide	UG/L	---	---	< 0.0472 U
Malathion	UG/L	---	---	< 0.94 U
Methoxychlor	UG/L	---	---	< 0.0472 U
Mevinphos	UG/L	---	---	< 0.94 U
Purgeable Petroleum Hydrocarbons				
GRO as Gasoline	UG/L	---	---	< 100 U
Semivolatile Organics				
1,2,4,5-Tetrachlorobenzene	UG/L	---	---	< 1 U
1,2-Dinitrobenzene	UG/L	---	---	< 5 U
1,2-Diphenylhydrazine	UG/L	---	---	< 1 U
1,3-Dimethyl adamatane	UG/L	---	---	< 5 U
1,3-Dinitrobenzene	UG/L	---	---	< 5 U
1,4-Dinitrobenzene	UG/L	---	---	< 5 U
1-Chloronaphthalene	UG/L	---	---	< 1 U
2,3,4,6-Tetrachlorophenol	UG/L	---	---	< 1 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER K

Property Owner		PROPERTY OWNER K	PROPERTY OWNER K	PROPERTY OWNER K
Location Description		THE WELL IS LOCATED ON THE SOUTH SIDE OF THE MILK HOUSE; IT FEEDS BOTH THE MILK HOUSE AND THE RESIDENCE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE MILK HOUSE; IT FEEDS BOTH THE MILK HOUSE AND THE RESIDENCE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE MILK HOUSE; IT FEEDS BOTH THE MILK HOUSE AND THE RESIDENCE.
Source Type		WELL	WELL	WELL
Well Depth		175	175	175
Sampled Before Treatment?		NA	Post-Treatment	Pre-Treatment
Sample ID		NTA0354-01072010-0855	0531201120201	1027201120202
Parameter and units	Sample Date	1/7/2010 (Baseline)	5/31/2011	10/27/2011
2,4,5-Trichlorophenol	UG/L	---	---	< 1 U
2,4,6-Trichlorophenol	UG/L	---	---	< 1 U
2,4-Dichlorophenol	UG/L	---	---	< 1 U
2,4-Dimethylphenol	UG/L	---	---	< 1 U
2,4-Dinitrophenol	UG/L	---	---	< 30 U
2,4-Dinitrotoluene	UG/L	---	---	< 5 U
2,6-Dichlorophenol	UG/L	---	---	< 1 U
2,6-Dinitrotoluene	UG/L	---	---	< 1 U
2-Butoxyethanol	UG/L	---	---	< 5 U
2-Chloronaphthalene	UG/L	---	---	< 1 U
2-Chlorophenol	UG/L	---	---	< 1 U
2-Methylnaphthalene	UG/L	---	---	< 0.5 U
2-Methylphenol	UG/L	---	---	< 1 U
2-Nitroaniline	UG/L	---	---	< 1 U
2-Nitrophenol	UG/L	---	---	< 1 U
3,3-Dichlorobenzidine	UG/L	---	---	< 5 U
3-Nitroaniline	UG/L	---	---	< 1 U
4,4'-Methylenebis(2-chloroaniline)	UG/L	---	---	< 15 UJ
4,4'-Methylenebis(N,N-dimethylanilin	UG/L	---	---	< 15 U
4,6-Dinitro-2-methylphenol	UG/L	---	---	< 15 U
4-Bromophenyl phenyl ether	UG/L	---	---	< 1 U
4-Chloro-3-methylphenol	UG/L	---	---	< 1 U
4-Chloroaniline	UG/L	---	---	< 1 U
4-Chlorophenyl phenyl ether	UG/L	---	---	< 1 U
4-Methylphenol	UG/L	---	---	< 1 U
4-Nitroaniline	UG/L	---	---	< 1 U
4-Nitrophenol	UG/L	---	---	< 30 U
Acenaphthene	UG/L	---	---	< 0.5 U
Acenaphthylene	UG/L	---	---	< 0.5 U
Acetophenone	UG/L	---	---	< 1 U
Adamantane	UG/L	---	---	< 5 U
Aniline	UG/L	---	---	< 1 U
Anthracene	UG/L	---	---	< 0.5 U
Benzo (a) anthracene	UG/L	---	---	< 0.5 U
Benzo (a) pyrene	UG/L	---	---	< 0.5 U
Benzo (b) fluoranthene	UG/L	---	---	< 0.5 U
Benzo (g,h,i) perylene	UG/L	---	---	< 0.5 U
Benzo (k) fluoranthene	UG/L	---	---	< 0.5 U
Benzoic acid	UG/L	---	---	< 15 U
Benzyl alcohol	UG/L	---	---	< 15 U
Bis(2-chloroethoxy)methane	UG/L	---	---	< 1 U
Bis(2-chloroethyl)ether	UG/L	---	---	< 1 U
bis(2-Chloroisopropyl)ether	UG/L	---	---	< 1 U
Bis(2-ethylhexyl)phthalate	UG/L	---	---	< 5 U
Butyl benzyl phthalate	UG/L	---	---	< 5 U
Carbazole	UG/L	---	---	< 1 U
Chlorobenzilate	UG/L	---	---	< 10 U
Chrysene	UG/L	---	---	< 0.5 U
Diallate (cis or trans)	UG/L	---	---	< 5 U
Dibenz (a,h) anthracene	UG/L	---	---	< 0.5 U
Dibenzofuran	UG/L	---	---	< 1 U
Diethyl phthalate	UG/L	---	---	< 5 U
Dimethyl phthalate	UG/L	---	---	< 5 U
Di-n-butyl phthalate	UG/L	---	---	< 5 U
Di-n-octyl phthalate	UG/L	---	---	< 5 U
Dinoseb	UG/L	---	---	< 5 U
Disulfoton	UG/L	---	---	< 50 U
d-Limonene	UG/L	---	---	< 5 U
Fluoranthene	UG/L	---	---	< 0.5 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER K

Property Owner		PROPERTY OWNER K	PROPERTY OWNER K	PROPERTY OWNER K
Location Description		THE WELL IS LOCATED ON THE SOUTH SIDE OF THE MILK HOUSE; IT FEEDS BOTH THE MILK HOUSE AND THE RESIDENCE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE MILK HOUSE; IT FEEDS BOTH THE MILK HOUSE AND THE RESIDENCE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE MILK HOUSE; IT FEEDS BOTH THE MILK HOUSE AND THE RESIDENCE.
Source Type		WELL	WELL	WELL
Well Depth		175	175	175
Sampled Before Treatment?		NA	Post-Treatment	Pre-Treatment
Sample ID		NTA0354-01072010-0855	0531201120201	1027201120202
Parameter and units	Sample Date	1/7/2010 (Baseline)	5/31/2011	10/27/2011
Fluorene	UG/L	---	---	< 0.5 U
Hexachlorobenzene	UG/L	---	---	< 0.5 U
Hexachlorobutadiene	UG/L	---	---	< 1 U
Hexachlorocyclopentadiene	UG/L	---	---	< 15 U
Hexachloroethane	UG/L	---	---	< 5 U
Indeno (1,2,3-cd) pyrene	UG/L	---	---	< 0.5 U
Isophorone	UG/L	---	---	< 1 U
Naphthalene	UG/L	---	---	< 0.5 U
Nitrobenzene	UG/L	---	---	< 1 U
N-Nitrosodiethylamine	UG/L	---	---	< 1 U
N-Nitrosodimethylamine	UG/L	---	---	< 5 U
N-Nitrosodi-n-butylamine	UG/L	---	---	< 5 U
N-Nitrosodi-n-propylamine	UG/L	---	---	< 1 U
N-Nitrosodiphenylamine	UG/L	---	---	< 1 U
N-Nitrosomethylethylamine	UG/L	---	---	< 5 U
Parathion-ethyl	UG/L	---	---	< 5 U
Parathion-methyl	UG/L	---	---	< 5 U
Pentachlorobenzene	UG/L	---	---	< 1 U
Pentachlorophenol	UG/L	---	---	< 5 U
Phenanthrene	UG/L	---	---	< 0.5 U
Phenol	UG/L	---	---	< 1 U
Phorate	UG/L	---	---	< 1 U
Pronamide	UG/L	---	---	< 1 U
Pyrene	UG/L	---	---	< 0.5 U
Pyridine	UG/L	---	---	< 5 U
Squalene	UG/L	---	---	< 5 U
Terbufos	UG/L	---	---	< 5 U
Terpineol	UG/L	---	---	< 5 U
Tributoxyethyl phosphate	UG/L	---	---	< 5 U
Trifluralin	UG/L	---	---	< 5 U
TICs				
1,2,3-Trimethylbenzene	UG/L	---	---	---
Volatile Organics				
1,1,1-Trichloroethane	UG/L	---	---	< 1.00 U
1,1,2-Trichloroethane	UG/L	---	---	< 1.00 U
1,1-Dichloroethane	UG/L	---	---	< 1.00 U
1,1-Dichloroethene	UG/L	---	---	< 1.00 U
1,2,3-Trimethylbenzene	UG/L	---	---	< 1.00 U
1,2,4-Trichlorobenzene	UG/L	---	---	---
1,2,4-Trimethylbenzene	UG/L	---	---	< 1.00 U
1,2-Dibromo-3-chloropropane	UG/L	---	---	< 0.1003 U
1,2-Dichlorobenzene	UG/L	---	---	< 1.00 U
1,2-Dichloroethane	UG/L	---	---	< 1.00 U
1,2-Dichloropropane	UG/L	---	---	---
1,3,5-Trimethylbenzene	UG/L	---	---	< 1.00 U
1,3-Dichlorobenzene	UG/L	---	---	< 1.00 U
1,4-Dichlorobenzene	UG/L	---	---	< 1.00 U
Acetone	UG/L	---	---	< 50.0 U
Benzene	UG/L	< 0.500 U	< 0.500 U	< 1.00 U
Carbon disulfide	UG/L	---	---	< 1.00 U
Carbon Tetrachloride	UG/L	---	---	< 1.00 U
Chlorobenzene	UG/L	---	---	< 1.00 U
Chloroform	UG/L	---	---	< 1.00 U
cis-1,2-Dichloroethene	UG/L	---	---	< 1.00 U
Diisopropyl Ether	UG/L	---	---	< 1.00 U
Ethanol	UG/L	---	---	< 100 U
Ethyl tert-Butyl Ether	UG/L	---	---	< 1.00 U
Ethylbenzene	UG/L	< 0.500 U	< 0.500 U	< 1.00 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER K

Property Owner		PROPERTY OWNER K	PROPERTY OWNER K	PROPERTY OWNER K
Location Description		THE WELL IS LOCATED ON THE SOUTH SIDE OF THE MILK HOUSE; IT FEEDS BOTH THE MILK HOUSE AND THE RESIDENCE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE MILK HOUSE; IT FEEDS BOTH THE MILK HOUSE AND THE RESIDENCE.	THE WELL IS LOCATED ON THE SOUTH SIDE OF THE MILK HOUSE; IT FEEDS BOTH THE MILK HOUSE AND THE RESIDENCE.
Source Type		WELL	WELL	WELL
Well Depth		175	175	175
Sampled Before Treatment?		NA	Post-Treatment	Pre-Treatment
Sample ID		NTA0354-01072010-0855	0531201120201	1027201120202
Parameter and units	Sample Date	1/7/2010 (Baseline)	5/31/2011	10/27/2011
Hexachlorobutadiene	UG/L	---	---	< 1 U
Isopropyl alcohol	UG/L	---	---	< 50.0 U
Isopropylbenzene	UG/L	---	---	< 1.00 U
m,p-Xylene	UG/L	---	---	< 2.00 U
Methoxychlor	UG/L	---	---	< 0.0472 U
Methyl tert-Butyl Ether	UG/L	---	---	< 1.00 U
Methylene Chloride	UG/L	---	---	< 5.00 U
Naphthalene	UG/L	---	---	< 5.00 U
o-Xylene	UG/L	---	---	< 1.00 U
Styrene	UG/L	---	---	---
Tert-Amyl Methyl Ether	UG/L	---	---	< 1.00 U
Tertiary Butyl Alcohol	UG/L	---	---	< 10.0 U
Tetrachloroethene	UG/L	---	---	< 1.00 U
Tetrahydrofuran	UG/L	---	---	---
Toluene	UG/L	< 0.500 U	< 0.500 U	< 1.00 U
trans-1,2-Dichloroethene	UG/L	---	---	< 1.00 U
Trichloroethene	UG/L	---	---	< 1.00 U
Vinyl chloride	UG/L	---	---	< 1.00 U
Xylenes, total	UG/L	< 0.500 U	< 0.500 U	< 3.00 U

Notes:
U : Parameter not detected at posted limit
< : Parameter not detected at posted limit
ND : Parameter not detected
H : Parameter analyzed beyond method recommended holding time
J : Estimated value
--- : Parameter not analyzed.
B : Blank qualified
ug/L : Micrograms per liter
mg/L : Milligrams per liter
NA : Not Available
NTU : Nephelometric Turbidity Unit
umho/cm : Micromhos per centimeter
colonies/100 ml : Colonies per 100 millileters

APPENDIX A-12
EPA STUDY WELL DATA
PROPERTY OWNER L

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER L

Property Owner		PROPERTY OWNER L	PROPERTY OWNER L
Location Description			
Source Type		WELL	WELL
Well Depth		225	225
Sampled Before Treatment?		NA	Pre-Treatment
Sample ID		NTD1742-04182010-1910	1103201120201
Parameter and units	Sample Date	4/18/2010 (Baseline)	11/3/2011
Aldehydes			
Gluteraldehyde	UG/L	---	---
Bacteria			
E. coli	colonies/100ml	---	Absent
Fecal coliform bacteria	colonies/100ml	---	< 1 U
Total Coliform Bacteria	colonies/100ml	---	Present
DBCP			
1,2-Dibromo-3-chloropropane	UG/L	---	< 0.1012 U
Extractable Petroleum Hydrocarbons			
Diesel	UG/L	---	< 94.3 U
General Chemistry			
Alkalinity, Total (CaCO3)	MG/L	---	177
Ammonia as N	MG/L	---	0.629
Bicarbonate Alkalinity as CaCO3	MG/L	184	179
Bromide	MG/L	---	< 2.5 U
Carbonate as CaCO3	MG/L	< 10.0 U	< 10.0 U
Chloride	MG/L	6.62	7.6 J
CO2 by Headspace	UG/L	---	< 12000 U
Cyanide	MG/L	---	---
Fluoride	MG/L	---	< 0.50 U
MBAS	MG/L	< 0.0500 U	< 0.12 U
Nitrate	MG/L	---	---
Nitrate Nitrogen	MG/L	---	1.1
Nitrite Nitrogen	MG/L	---	< 0.50 U
Oil & Grease HEM	MG/L	< 6.10 U	< 4.82 U
pH	pH UNITS	7.50 H	7.50 H
Phosphorus	MG/L	---	< 0.100 U
Specific conductance	UMHO/CM	398	393
Sulfate	MG/L	22.6	22.4
Temperature of pH determination	CELSIUS	21.0 H	21.0 H
Total Dissolved Solids	MG/L	233	229
Total Suspended Solids	MG/L	< 1.00 U	< 1.00 U
Turbidity	NTU	< 1.00 U	< 0.30 U
Glycols			
1,2-Propylene Glycol	MG/L	---	---
Diethylene Glycol	MG/L	---	< 10 U
Ethylene Glycol	MG/L	---	---
Tetraethylene glycol	MG/L	---	15 JBJ
Triethylene glycol	MG/L	---	< 10 U
Light Gases			
Acetylene	MG/L	---	< 0.00500 U
Ethane	MG/L	< 0.0260 U	< 0.00500 U
Ethene	MG/L	---	< 0.00500 U
Methane	MG/L	0.048	< 0.00500 U
n-Butane	MG/L	---	< 0.00500 U
Propane	MG/L	< 0.0340 U	< 0.00500 U
Low Molecular Weight Acids			
Acetic Acid	UG/L	---	< 10000 U
Butyric Acid	UG/L	---	< 10000 U
Formic Acid	UG/L	---	< 10000 U
Isobutyric acid	UG/L	---	< 10000 U
Lactic acid	UG/L	---	< 5000 U
Propionic Acid	UG/L	---	< 13000 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER L

Property Owner		PROPERTY OWNER L	PROPERTY OWNER L
Location Description			
Source Type		WELL	WELL
Well Depth		225	225
Sampled Before Treatment?		NA	Pre-Treatment
Sample ID		NTD1742-04182010-1910	1103201120201
Parameter and units	Sample Date	4/18/2010 (Baseline)	11/3/2011
Metals, 6020x			
Cesium	MG/L	---	< 0.0001 U
Cesium, Dissolved	MG/L	---	< 0.0001 U
Potassium	MG/L	---	1.6
Potassium, Dissolved	MG/L	---	1.5
Silicon	MG/L	---	4.6
Silicon, Dissolved	MG/L	---	4.5
Thorium	MG/L	---	< 0.002 U
Thorium, Dissolved	MG/L	---	< 0.002 U
Uranium	MG/L	---	0.0014
Uranium, Dissolved	MG/L	---	0.0014
Metals, Total			
Aluminum	MG/L	---	< 0.0200 U
Antimony	MG/L	---	< 0.00200 U
Arsenic	MG/L	< 0.0100 U	< 0.00200 U
Barium	MG/L	0.165	0.168
Beryllium	MG/L	---	< 0.00200 U
Boron	MG/L	---	< 0.0500 U
Cadmium	MG/L	< 0.00100 U	< 0.00100 U
Calcium	MG/L	47.3	47
Chromium	MG/L	< 0.00500 U	< 0.00200 U
Cobalt	MG/L	---	< 0.00200 U
Copper	MG/L	---	< 0.00500 U
Hardness, CaCO3	MG/L	---	---
Iron	MG/L	< 0.0500 U	< 0.0500 U
Lead	MG/L	< 0.00500 U	< 0.00200 U
Lithium	MG/L	---	---
Magnesium	MG/L	15.5	15.2
Manganese	MG/L	< 0.0150 U	< 0.00500 U
Mercury	MG/L	< 0.000200 U	< 0.000200 U
Molybdenum	MG/L	---	< 0.00500 U
Nickel	MG/L	---	< 0.00500 U
Potassium	MG/L	1.93	1.45
Selenium	MG/L	< 0.0100 U	< 0.00200 U
Silver	MG/L	< 0.00500 U	< 0.00200 U
Sodium	MG/L	14.6	14
Strontium	MG/L	---	0.987
Sulfur	MG/L	7.6	6.23
Thallium	MG/L	---	< 0.00200 U
Titanium	MG/L	---	< 0.00200 U
Vanadium	MG/L	---	< 0.00400 U
Zinc	MG/L	---	< 0.0500 U
Metals, Dissolved			
Aluminum, Dissolved	MG/L	---	< 0.0200 U
Antimony, Dissolved	MG/L	---	< 0.00200 U
Arsenic, Dissolved	MG/L	---	< 0.00200 U
Barium, Dissolved	MG/L	---	0.166
Beryllium, Dissolved	MG/L	---	< 0.00200 U
Boron, Dissolved	MG/L	---	0.0525
Cadmium, Dissolved	MG/L	---	< 0.00100 U
Calcium, Dissolved	MG/L	---	51.8
Chromium, Dissolved	MG/L	---	< 0.00200 U
Cobalt, Dissolved	MG/L	---	< 0.00200 U
Copper, Dissolved	MG/L	---	< 0.00500 U
Iron, Dissolved	MG/L	---	< 0.0500 U
Lead, Dissolved	MG/L	---	< 0.00200 U
Magnesium, Dissolved	MG/L	---	16.5
Manganese, Dissolved	MG/L	---	< 0.00500 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER L

Property Owner		PROPERTY OWNER L	PROPERTY OWNER L
Location Description			
Source Type		WELL	WELL
Well Depth		225	225
Sampled Before Treatment?		NA	Pre-Treatment
Sample ID		NTD1742-04182010-1910	1103201120201
Parameter and units	Sample Date	4/18/2010 (Baseline)	11/3/2011
Mercury, Dissolved	MG/L	---	< 0.000200 U
Molybdenum, Dissolved	MG/L	---	< 0.00500 U
Nickel, Dissolved	MG/L	---	< 0.00500 U
Potassium, Dissolved	MG/L	---	1.69
Selenium, Dissolved	MG/L	---	< 0.00200 U
Silver, Dissolved	MG/L	---	< 0.00200 U
Sodium, Dissolved	MG/L	---	15.5
Strontium, Dissolved	MG/L	---	1.1
Sulfur, Dissolved	MG/L	---	6.96
Thallium, Dissolved	MG/L	---	< 0.00200 U
Titanium, Dissolved	MG/L	---	< 0.00200 U
Vanadium, Dissolved	MG/L	---	< 0.00400 U
Zinc, Dissolved	MG/L	---	< 0.0500 U
Miscellaneous Organics			
Inorganic Carbon, Dissolved	MG/L	---	38.9
Organic Carbon, Dissolved	MG/L	---	< 1.00 U
Pesticides and PCBs			
4,4'-DDD	UG/L	---	< 0.0236 U
4,4'-DDE	UG/L	---	< 0.0236 U
4,4'-DDT	UG/L	---	< 0.0236 U
Aldrin	UG/L	---	< 0.0236 U
alpha-BHC	UG/L	---	< 0.0236 U
Azinphos-methyl	UG/L	---	< 0.94 U
beta-BHC	UG/L	---	< 0.0236 U
Carbaryl	UG/L	---	< 6.0 U
delta-BHC	UG/L	---	< 0.0236 U
Dichlorvos	UG/L	---	< 0.94 U
Dieldrin	UG/L	---	< 0.0236 U
Disulfoton	UG/L	---	< 0.94 U
Endosulfan I	UG/L	---	< 0.0236 U
Endosulfan II	UG/L	---	< 0.0236 U
Endosulfan sulfate	UG/L	---	< 0.0236 U
Endrin	UG/L	---	< 0.0236 U
Endrin aldehyde	UG/L	---	< 0.0236 U
Endrin ketone	UG/L	---	< 0.0236 U
gamma-BHC (Lindane)	UG/L	---	< 0.0236 U
Heptachlor	UG/L	---	< 0.0236 U
Heptachlor epoxide	UG/L	---	< 0.0236 U
Malathion	UG/L	---	< 0.94 U
Methoxychlor	UG/L	---	< 0.0236 U
Mevinphos	UG/L	---	< 0.94 U
Purgeable Petroleum Hydrocarbons			
GRO as Gasoline	UG/L	---	< 100 U
Semivolatile Organics			
1,2,4,5-Tetrachlorobenzene	UG/L	---	< 1 U
1,2-Dinitrobenzene	UG/L	---	< 5 U
1,2-Diphenylhydrazine	UG/L	---	< 1 U
1,3-Dimethyl adamatane	UG/L	---	< 5 U
1,3-Dinitrobenzene	UG/L	---	< 5 U
1,4-Dinitrobenzene	UG/L	---	< 5 U
1-Chloronaphthalene	UG/L	---	< 1 U
2,3,4,6-Tetrachlorophenol	UG/L	---	< 1 U
2,4,5-Trichlorophenol	UG/L	---	< 1 U
2,4,6-Trichlorophenol	UG/L	---	< 1 U
2,4-Dichlorophenol	UG/L	---	< 1 U
2,4-Dimethylphenol	UG/L	---	< 1 U
2,4-Dinitrophenol	UG/L	---	< 29 U
2,4-Dinitrotoluene	UG/L	---	< 5 U
2,6-Dichlorophenol	UG/L	---	< 1 U
2,6-Dinitrotoluene	UG/L	---	< 1 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER L

Property Owner		PROPERTY OWNER L	PROPERTY OWNER L
Location Description			
Source Type		WELL	WELL
Well Depth		225	225
Sampled Before Treatment?		NA	Pre-Treatment
Sample ID		NTD1742-04182010-1910	1103201120201
Parameter and units	Sample Date	4/18/2010 (Baseline)	11/3/2011
2-Butoxyethanol	UG/L	---	< 5 UJ
2-Chloronaphthalene	UG/L	---	< 1 U
2-Chlorophenol	UG/L	---	< 1 U
2-Methylnaphthalene	UG/L	---	< 0.5 U
2-Methylphenol	UG/L	---	< 1 U
2-Nitroaniline	UG/L	---	< 1 U
2-Nitrophenol	UG/L	---	< 1 U
3,3-Dichlorobenzidine	UG/L	---	< 5 U
3-Nitroaniline	UG/L	---	< 1 U
4,4'-Methylenebis(2-chloroaniline)	UG/L	---	< 14 UJ
4,4'-Methylenebis(N,N-dimethylanilin	UG/L	---	< 14 UJ
4,6-Dinitro-2-methylphenol	UG/L	---	< 14 U
4-Bromophenyl phenyl ether	UG/L	---	< 1 U
4-Chloro-3-methylphenol	UG/L	---	< 1 UJ
4-Chloroaniline	UG/L	---	< 1 U
4-Chlorophenyl phenyl ether	UG/L	---	< 1 U
4-Methylphenol	UG/L	---	< 1 U
4-Nitroaniline	UG/L	---	< 1 U
4-Nitrophenol	UG/L	---	< 29 U
Acenaphthene	UG/L	---	< 0.5 U
Acenaphthylene	UG/L	---	< 0.5 U
Acetophenone	UG/L	---	< 1 U
Adamantane	UG/L	---	< 5 U
Aniline	UG/L	---	< 1 U
Anthracene	UG/L	---	< 0.5 U
Benzo (a) anthracene	UG/L	---	< 0.5 UJ
Benzo (a) pyrene	UG/L	---	< 0.5 U
Benzo (b) fluoranthene	UG/L	---	< 0.5 U
Benzo (g,h,i) perylene	UG/L	---	< 0.5 U
Benzo (k) fluoranthene	UG/L	---	< 0.5 U
Benzoic acid	UG/L	---	< 14 UJ
Benzyl alcohol	UG/L	---	< 14 U
Bis(2-chloroethoxy)methane	UG/L	---	< 1 U
Bis(2-chloroethyl)ether	UG/L	---	< 1 U
bis(2-Chloroisopropyl)ether	UG/L	---	< 1 U
Bis(2-ethylhexyl)phthalate	UG/L	---	< 5 UJ
Butyl benzyl phthalate	UG/L	---	< 5 UJ
Carbazole	UG/L	---	< 1 U
Chlorobenzilate	UG/L	---	< 10 U
Chrysene	UG/L	---	< 0.5 UJ
Diallate (cis or trans)	UG/L	---	< 5 U
Dibenz (a,h) anthracene	UG/L	---	< 0.5 U
Dibenzofuran	UG/L	---	< 1 U
Diethyl phthalate	UG/L	---	< 5 U
Dimethyl phthalate	UG/L	---	< 5 U
Di-n-butyl phthalate	UG/L	---	< 5 U
Di-n-octyl phthalate	UG/L	---	< 5 U
Dinoseb	UG/L	---	< 5 U
Disulfoton	UG/L	---	< 48 U
d-Limonene	UG/L	---	< 5 U
Fluoranthene	UG/L	---	< 0.5 U
Fluorene	UG/L	---	< 0.5 U
Hexachlorobenzene	UG/L	---	< 0.5 U
Hexachlorobutadiene	UG/L	---	< 1 U
Hexachlorocyclopentadiene	UG/L	---	< 14 U
Hexachloroethane	UG/L	---	< 5 U
Indeno (1,2,3-cd) pyrene	UG/L	---	< 0.5 U
Isophorone	UG/L	---	< 1 U
Naphthalene	UG/L	---	< 0.5 U
Nitrobenzene	UG/L	---	< 1 U
N-Nitrosodiethylamine	UG/L	---	< 1 U
N-Nitrosodimethylamine	UG/L	---	< 5 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER L

Property Owner		PROPERTY OWNER L	PROPERTY OWNER L
Location Description			
Source Type		WELL	WELL
Well Depth		225	225
Sampled Before Treatment?		NA	Pre-Treatment
Sample ID		NTD1742-04182010-1910	1103201120201
Parameter and units	Sample Date	4/18/2010 (Baseline)	11/3/2011
N-Nitrosodi-n-butylamine	UG/L	---	< 5 U
N-Nitrosodi-n-propylamine	UG/L	---	< 1 U
N-Nitrosodiphenylamine	UG/L	---	< 1 U
N-Nitrosomethylethylamine	UG/L	---	< 5 U
Parathion-ethyl	UG/L	---	< 5 U
Parathion-methyl	UG/L	---	< 5 U
Pentachlorobenzene	UG/L	---	< 1 U
Pentachlorophenol	UG/L	---	< 5 U
Phenanthrene	UG/L	---	< 0.5 U
Phenol	UG/L	---	< 1 U
Phorate	UG/L	---	< 1 U
Pronamide	UG/L	---	< 1 U
Pyrene	UG/L	---	< 0.5 U
Pyridine	UG/L	---	< 5 U
Squalene	UG/L	---	< 5 UJ
Terbufos	UG/L	---	< 5 UJ
Terpineol	UG/L	---	< 5 U
Tributoxyethyl phosphate	UG/L	---	< 5 U
Trifluralin	UG/L	---	< 5 UJ
TICs			
1,2,3-Trimethylbenzene	UG/L	---	---
Volatile Organics			
1,1,1-Trichloroethane	UG/L	---	< 1.00 U
1,1,2-Trichloroethane	UG/L	---	< 1.00 U
1,1-Dichloroethane	UG/L	---	< 1.00 U
1,1-Dichloroethene	UG/L	---	< 1.00 U
1,2,3-Trimethylbenzene	UG/L	---	< 1.00 U
1,2,4-Trichlorobenzene	UG/L	---	---
1,2,4-Trimethylbenzene	UG/L	---	< 1.00 U
1,2-Dibromo-3-chloropropane	UG/L	---	< 0.1012 U
1,2-Dichlorobenzene	UG/L	---	< 1.00 U
1,2-Dichloroethane	UG/L	---	< 1.00 U
1,2-Dichloropropane	UG/L	---	---
1,3,5-Trimethylbenzene	UG/L	---	< 1.00 U
1,3-Dichlorobenzene	UG/L	---	< 1.00 U
1,4-Dichlorobenzene	UG/L	---	< 1.00 U
Acetone	UG/L	---	< 50.0 U
Benzene	UG/L	< 0.500 U	< 1.00 U
Carbon disulfide	UG/L	---	< 1.00 U
Carbon Tetrachloride	UG/L	---	< 1.00 U
Chlorobenzene	UG/L	---	< 1.00 U
Chloroform	UG/L	---	< 1.00 U
cis-1,2-Dichloroethene	UG/L	---	< 1.00 U
Diisopropyl Ether	UG/L	---	< 1.00 U
Ethanol	UG/L	---	< 100 U
Ethyl tert-Butyl Ether	UG/L	---	< 1.00 U
Ethylbenzene	UG/L	< 0.500 U	< 1.00 U
Hexachlorobutadiene	UG/L	---	< 1 U
Isopropyl alcohol	UG/L	---	< 50.0 U
Isopropylbenzene	UG/L	---	< 1.00 U
m,p-Xylene	UG/L	---	< 2.00 U
Methoxychlor	UG/L	---	< 0.0236 U
Methyl tert-Butyl Ether	UG/L	---	< 1.00 U
Methylene Chloride	UG/L	---	< 5.00 U
Naphthalene	UG/L	---	< 5.00 U
o-Xylene	UG/L	---	< 1.00 U
Styrene	UG/L	---	---
Tert-Amyl Methyl Ether	UG/L	---	< 1.00 U
Tertiary Butyl Alcohol	UG/L	---	< 10.0 U
Tetrachloroethene	UG/L	---	< 1.00 U
Tetrahydrofuran	UG/L	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER L

	Property Owner	PROPERTY OWNER L	PROPERTY OWNER L
	Location Description		
	Source Type	WELL	WELL
	Well Depth	225	225
	Sampled Before Treatment?	NA	Pre-Treatment
	Sample ID	NTD1742-04182010-1910	1103201120201
Parameter and units	Sample Date	4/18/2010 (Baseline)	11/3/2011
Toluene	UG/L	< 0.500 U	< 1.00 U
trans-1,2-Dichloroethene	UG/L	---	< 1.00 U
Trichloroethene	UG/L	---	< 1.00 U
Vinyl chloride	UG/L	---	< 1.00 U
Xylenes, total	UG/L	< 0.500 U	< 3.00 U

Notes:

U : Parameter not detected at posted limit
< : Parameter not detected at posted limit
ND : Parameter not detected
H : Parameter analyzed beyond method recommended holding time
J : Estimated value
--- : Parameter not analyzed.
B : Blank qualified
ug/L : Micrograms per liter
mg/L : Milligrams per liter
NA : Not Available
NTU : Nephelometric Turbidity Unit
umho/cm : Micromhos per centimeter
colonies/100 ml : Colonies per 100 milliliters

APPENDIX A-13
EPA STUDY WELL DATA
PROPERTY OWNER M

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER M

Property Owner		PROPERTY OWNER M	PROPERTY OWNER M	PROPERTY OWNER M	PROPERTY OWNER M
Location Description		THE WELL IS LOCATED NORTH OF THE HOUSE.	THE WELL IS LOCATED NORTH OF THE HOUSE.	THE WELL IS LOCATED NORTH OF THE HOUSE.	THE WELL IS LOCATED NORTH OF THE HOUSE.
Source Type		WELL	WELL	WELL	WELL
Well Depth		440	440	440	440
Sampled Before Treatment?		NA	Pre-Treatment	Pre-Treatment	Pre-Treatment
Sample ID		NTA0325-01062010-1605	1202201012501	0411201112403	1028201120202
Parameter and units	Sample Date	1/6/2010 (Baseline)	12/2/2010	4/11/2011	10/28/2011
Aldehydes					
Gluteraldehyde	UG/L	---	---	---	---
Bacteria					
E. coli	colonies/100ml	---	---	---	Present
Fecal coliform bacteria	colonies/100ml	---	---	---	3
Total Coliform Bacteria	colonies/100ml	---	---	---	Present
DBCP					
1,2-Dibromo-3-chloropropane	UG/L	---	---	---	< 0.1020 U
Extractable Petroleum Hydrocarbons					
Diesel	UG/L	---	---	---	< 95.2 U
General Chemistry					
Alkalinity, Total (CaCO3)	MG/L	---	---	---	150
Ammonia as N	MG/L	---	---	---	< 0.100 U
Bicarbonate Alkalinity as CaCO3	MG/L	159	142	---	150
Bromide	MG/L	---	---	---	< 2.5 U
Carbonate as CaCO3	MG/L	< 10.0 U	< 10.0 U	---	< 10.0 U
Chloride	MG/L	4.3	7.31	---	8.6 J
CO2 by Headspace	UG/L	---	---	---	< 12000 U
Cyanide	MG/L	---	---	---	---
Fluoride	MG/L	---	---	---	< 0.50 U
MBAS	MG/L	< 0.0500 U	< 0.0500 U	---	< 0.12 U
Nitrate	MG/L	---	---	---	---
Nitrate Nitrogen	MG/L	---	---	---	1.4
Nitrite Nitrogen	MG/L	---	---	---	< 0.50 UJ
Oil & Grease HEM	MG/L	< 5.49 U	< 6.02 U	---	< 4.76 U
pH	pH UNITS	7.00 H	7.60 H	---	7.40 H
Phosphorus	MG/L	---	---	---	< 0.100 U
Specific conductance	UMHO/CM	340	336	---	330
Sulfate	MG/L	14.7	15.7	---	12.6 J
Temperature of pH determination	CELSIUS	21.7 H	21.8 H	---	21.0 H
Total Dissolved Solids	MG/L	198	173	---	176
Total Suspended Solids	MG/L	< 1.00 U	1	---	< 1.00 U
Turbidity	NTU	< 1.00 U	1.1	---	1.9
Glycols					
1,2-Propylene Glycol	MG/L	---	---	---	---
Diethylene Glycol	MG/L	---	---	---	< 10 U
Ethylene Glycol	MG/L	---	---	---	---
Tetraethylene glycol	MG/L	---	---	---	< 10 UJ
Triethylene glycol	MG/L	---	---	---	< 10 U
Light Gases					
Acetylene	MG/L	---	---	---	< 0.00500 U
Ethane	MG/L	< 0.0260 U	< 0.0260 U	---	< 0.00500 U
Ethene	MG/L	---	---	---	< 0.00500 U
Methane	MG/L	< 0.0260 U	< 0.0260 U	---	< 0.00500 U
n-Butane	MG/L	---	---	---	< 0.00500 U
Propane	MG/L	< 0.0340 U	< 0.0340 U	---	< 0.00500 U
Low Molecular Weight Acids					
Acetic Acid	UG/L	---	---	---	< 10000 U
Butyric Acid	UG/L	---	---	---	< 10000 U
Formic Acid	UG/L	---	---	---	< 10000 U
Isobutyric acid	UG/L	---	---	---	< 10000 U
Lactic acid	UG/L	---	---	---	< 5000 U
Propionic Acid	UG/L	---	---	---	< 13000 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER M

Property Owner		PROPERTY OWNER M	PROPERTY OWNER M	PROPERTY OWNER M	PROPERTY OWNER M
Location Description		THE WELL IS LOCATED NORTH OF THE HOUSE.	THE WELL IS LOCATED NORTH OF THE HOUSE.	THE WELL IS LOCATED NORTH OF THE HOUSE.	THE WELL IS LOCATED NORTH OF THE HOUSE.
Source Type		WELL	WELL	WELL	WELL
Well Depth		440	440	440	440
Sampled Before Treatment?		NA	Pre-Treatment	Pre-Treatment	Pre-Treatment
Sample ID		NTA0325-01062010-1605	1202201012501	0411201112403	1028201120202
Parameter and units	Sample Date	1/6/2010 (Baseline)	12/2/2010	4/11/2011	10/28/2011
Metals, 6020x					
Cesium	MG/L	---	---	---	< 0.0001 U
Cesium, Dissolved	MG/L	---	---	---	< 0.0001 U
Potassium	MG/L	---	---	---	1.2
Potassium, Dissolved	MG/L	---	---	---	1.14
Silicon	MG/L	---	---	---	4.46
Silicon, Dissolved	MG/L	---	---	---	4.25
Thorium	MG/L	---	---	---	< 0.002 U
Thorium, Dissolved	MG/L	---	---	---	< 0.002 U
Uranium	MG/L	---	---	---	< 0.001 U
Uranium, Dissolved	MG/L	---	---	---	< 0.001 U
Metals, Total					
Aluminum	MG/L	---	---	---	0.0295
Antimony	MG/L	---	---	---	< 0.00200 U
Arsenic	MG/L	< 0.0100 U	< 0.0100 U	---	< 0.00200 U
Barium	MG/L	0.17	0.18	---	0.171
Beryllium	MG/L	---	---	---	< 0.00200 U
Boron	MG/L	---	---	---	< 0.0500 U
Cadmium	MG/L	< 0.00100 U	< 0.00100 U	---	< 0.00100 U
Calcium	MG/L	44.6	46.7	---	48.8
Chromium	MG/L	< 0.00500 U	< 0.00500 U	---	< 0.00200 U
Cobalt	MG/L	---	---	---	< 0.00200 U
Copper	MG/L	---	---	---	0.025
Hardness, CaCO3	MG/L	---	---	---	---
Iron	MG/L	0.103	0.235	---	0.143
Lead	MG/L	< 0.00500 U	0.011	0.0124	0.003
Lithium	MG/L	---	---	---	---
Magnesium	MG/L	12.6	12	---	11.9
Manganese	MG/L	< 0.0150 U	< 0.0150 U	---	0.00754
Mercury	MG/L	< 0.000200 U	< 0.000200 U	---	< 0.000200 U
Molybdenum	MG/L	---	---	---	< 0.00500 U
Nickel	MG/L	---	---	---	< 0.00500 U
Potassium	MG/L	1.13	1.12	---	1.03
Selenium	MG/L	< 0.0100 U	< 0.0100 U	---	< 0.00200 U
Silver	MG/L	< 0.00500 U	< 0.00500 U	---	< 0.00200 U
Sodium	MG/L	3.65	3.36	---	2.72
Strontium	MG/L	---	---	---	0.194
Sulfur	MG/L	7.27	3.5	---	3.23
Thallium	MG/L	---	---	---	< 0.00200 U
Titanium	MG/L	---	---	---	< 0.00200 U
Vanadium	MG/L	---	---	---	< 0.00400 U
Zinc	MG/L	---	---	---	< 0.0500 U
Metals, Dissolved					
Aluminum, Dissolved	MG/L	---	---	---	< 0.0200 U
Antimony, Dissolved	MG/L	---	---	---	< 0.00200 U
Arsenic, Dissolved	MG/L	---	---	---	< 0.00200 U
Barium, Dissolved	MG/L	---	---	---	0.172
Beryllium, Dissolved	MG/L	---	---	---	< 0.00200 U
Boron, Dissolved	MG/L	---	---	---	< 0.0500 U
Cadmium, Dissolved	MG/L	---	---	---	< 0.00100 U
Calcium, Dissolved	MG/L	---	---	---	48.4
Chromium, Dissolved	MG/L	---	---	---	< 0.00200 U
Cobalt, Dissolved	MG/L	---	---	---	< 0.00200 U
Copper, Dissolved	MG/L	---	---	---	0.0197
Iron, Dissolved	MG/L	---	---	---	< 0.0500 U
Lead, Dissolved	MG/L	---	---	---	< 0.00200 U
Magnesium, Dissolved	MG/L	---	---	---	11.6

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER M

Property Owner		PROPERTY OWNER M	PROPERTY OWNER M	PROPERTY OWNER M	PROPERTY OWNER M
Location Description		THE WELL IS LOCATED NORTH OF THE HOUSE.	THE WELL IS LOCATED NORTH OF THE HOUSE.	THE WELL IS LOCATED NORTH OF THE HOUSE.	THE WELL IS LOCATED NORTH OF THE HOUSE.
Source Type		WELL	WELL	WELL	WELL
Well Depth		440	440	440	440
Sampled Before Treatment?		NA	Pre-Treatment	Pre-Treatment	Pre-Treatment
Sample ID		NTA0325-01062010-1605	1202201012501	0411201112403	1028201120202
Parameter and units	Sample Date	1/6/2010 (Baseline)	12/2/2010	4/11/2011	10/28/2011
Manganese, Dissolved	MG/L	---	---	---	< 0.00500 U
Mercury, Dissolved	MG/L	---	---	---	< 0.000200 U
Molybdenum, Dissolved	MG/L	---	---	---	< 0.00500 U
Nickel, Dissolved	MG/L	---	---	---	< 0.00500 U
Potassium, Dissolved	MG/L	---	---	---	1.08
Selenium, Dissolved	MG/L	---	---	---	< 0.00200 U
Silver, Dissolved	MG/L	---	---	---	< 0.00200 U
Sodium, Dissolved	MG/L	---	---	---	2.65
Strontium, Dissolved	MG/L	---	---	---	0.195
Sulfur, Dissolved	MG/L	---	---	---	3.31
Thallium, Dissolved	MG/L	---	---	---	< 0.00200 U
Titanium, Dissolved	MG/L	---	---	---	< 0.00200 U
Vanadium, Dissolved	MG/L	---	---	---	< 0.00400 U
Zinc, Dissolved	MG/L	---	---	---	< 0.0500 U
Miscellaneous Organics					
Inorganic Carbon, Dissolved	MG/L	---	---	---	34.6
Organic Carbon, Dissolved	MG/L	---	---	---	< 1.00 U
Pesticides and PCBs					
4,4'-DDD	UG/L	---	---	---	< 0.0476 U
4,4'-DDE	UG/L	---	---	---	< 0.0476 U
4,4'-DDT	UG/L	---	---	---	< 0.0476 U
Aldrin	UG/L	---	---	---	< 0.0476 U
alpha-BHC	UG/L	---	---	---	< 0.0476 U
Azinphos-methyl	UG/L	---	---	---	< 0.95 U
beta-BHC	UG/L	---	---	---	< 0.0476 U
Carbaryl	UG/L	---	---	---	< 6.0 U
delta-BHC	UG/L	---	---	---	< 0.0476 U
Dichlorvos	UG/L	---	---	---	< 0.95 U
Dieldrin	UG/L	---	---	---	< 0.0476 U
Disulfoton	UG/L	---	---	---	< 0.95 U
Endosulfan I	UG/L	---	---	---	< 0.0476 U
Endosulfan II	UG/L	---	---	---	< 0.0476 U
Endosulfan sulfate	UG/L	---	---	---	< 0.0476 U
Endrin	UG/L	---	---	---	< 0.0476 U
Endrin aldehyde	UG/L	---	---	---	< 0.0476 U
Endrin ketone	UG/L	---	---	---	< 0.0476 U
gamma-BHC (Lindane)	UG/L	---	---	---	< 0.0476 U
Heptachlor	UG/L	---	---	---	< 0.0476 U
Heptachlor epoxide	UG/L	---	---	---	< 0.0476 U
Malathion	UG/L	---	---	---	< 0.95 U
Methoxychlor	UG/L	---	---	---	< 0.0476 U
Mevinphos	UG/L	---	---	---	< 0.95 U
Purgeable Petroleum Hydrocarbons					
GRO as Gasoline	UG/L	---	---	---	< 100 U
Semivolatile Organics					
1,2,4,5-Tetrachlorobenzene	UG/L	---	---	---	< 0.9 U
1,2-Dinitrobenzene	UG/L	---	---	---	< 5 U
1,2-Diphenylhydrazine	UG/L	---	---	---	< 0.9 U
1,3-Dimethyl adamatane	UG/L	---	---	---	< 5 U
1,3-Dinitrobenzene	UG/L	---	---	---	< 5 U
1,4-Dinitrobenzene	UG/L	---	---	---	< 5 U
1-Chloronaphthalene	UG/L	---	---	---	< 0.9 U
2,3,4,6-Tetrachlorophenol	UG/L	---	---	---	< 0.9 U
2,4,5-Trichlorophenol	UG/L	---	---	---	< 0.9 U
2,4,6-Trichlorophenol	UG/L	---	---	---	< 0.9 U
2,4-Dichlorophenol	UG/L	---	---	---	< 0.9 U
2,4-Dimethylphenol	UG/L	---	---	---	< 0.9 U
2,4-Dinitrophenol	UG/L	---	---	---	< 28 U
2,4-Dinitrotoluene	UG/L	---	---	---	< 5 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER M

Property Owner		PROPERTY OWNER M	PROPERTY OWNER M	PROPERTY OWNER M	PROPERTY OWNER M
Location Description		THE WELL IS LOCATED NORTH OF THE HOUSE.	THE WELL IS LOCATED NORTH OF THE HOUSE.	THE WELL IS LOCATED NORTH OF THE HOUSE.	THE WELL IS LOCATED NORTH OF THE HOUSE.
Source Type		WELL	WELL	WELL	WELL
Well Depth		440	440	440	440
Sampled Before Treatment?		NA	Pre-Treatment	Pre-Treatment	Pre-Treatment
Sample ID		NTA0325-01062010-1605	1202201012501	0411201112403	1028201120202
Parameter and units	Sample Date	1/6/2010 (Baseline)	12/2/2010	4/11/2011	10/28/2011
2,6-Dichlorophenol	UG/L	---	---	---	< 0.9 U
2,6-Dinitrotoluene	UG/L	---	---	---	< 0.9 U
2-Butoxyethanol	UG/L	---	---	---	< 5 UJ
2-Chloronaphthalene	UG/L	---	---	---	< 0.9 U
2-Chlorophenol	UG/L	---	---	---	< 0.9 U
2-Methylnaphthalene	UG/L	---	---	---	< 0.5 U
2-Methylphenol	UG/L	---	---	---	< 0.9 U
2-Nitroaniline	UG/L	---	---	---	< 0.9 U
2-Nitrophenol	UG/L	---	---	---	< 0.9 U
3,3-Dichlorobenzidine	UG/L	---	---	---	< 5 U
3-Nitroaniline	UG/L	---	---	---	< 0.9 U
4,4'-Methylenebis(2-chloroaniline)	UG/L	---	---	---	< 14 U
4,4'-Methylenebis(N,N-dimethylanilin	UG/L	---	---	---	< 14 UJ
4,6-Dinitro-2-methylphenol	UG/L	---	---	---	< 14 U
4-Bromophenyl phenyl ether	UG/L	---	---	---	< 0.9 U
4-Chloro-3-methylphenol	UG/L	---	---	---	< 0.9 U
4-Chloroaniline	UG/L	---	---	---	< 0.9 U
4-Chlorophenyl phenyl ether	UG/L	---	---	---	< 0.9 U
4-Methylphenol	UG/L	---	---	---	< 0.9 U
4-Nitroaniline	UG/L	---	---	---	< 0.9 UJ
4-Nitrophenol	UG/L	---	---	---	< 28 U
Acenaphthene	UG/L	---	---	---	< 0.5 U
Acenaphthylene	UG/L	---	---	---	< 0.5 U
Acetophenone	UG/L	---	---	---	< 0.9 U
Adamantane	UG/L	---	---	---	< 5 U
Aniline	UG/L	---	---	---	< 0.9 U
Anthracene	UG/L	---	---	---	< 0.5 U
Benzo (a) anthracene	UG/L	---	---	---	< 0.5 U
Benzo (a) pyrene	UG/L	---	---	---	< 0.5 U
Benzo (b) fluoranthene	UG/L	---	---	---	< 0.5 U
Benzo (g,h,i) perylene	UG/L	---	---	---	< 0.5 U
Benzo (k) fluoranthene	UG/L	---	---	---	< 0.5 U
Benzoic acid	UG/L	---	---	---	< 14 U
Benzyl alcohol	UG/L	---	---	---	< 14 U
Bis(2-chloroethoxy)methane	UG/L	---	---	---	< 0.9 U
Bis(2-chloroethyl)ether	UG/L	---	---	---	< 0.9 U
bis(2-Chloroisopropyl)ether	UG/L	---	---	---	< 0.9 U
Bis(2-ethylhexyl)phthalate	UG/L	---	---	---	< 5 U
Butyl benzyl phthalate	UG/L	---	---	---	< 5 U
Carbazole	UG/L	---	---	---	< 0.9 U
Chlorobenzilate	UG/L	---	---	---	< 9 U
Chrysene	UG/L	---	---	---	< 0.5 U
Diallate (cis or trans)	UG/L	---	---	---	< 5 U
Dibenz (a,h) anthracene	UG/L	---	---	---	< 0.5 U
Dibenzofuran	UG/L	---	---	---	< 0.9 U
Diethyl phthalate	UG/L	---	---	---	< 5 U
Dimethyl phthalate	UG/L	---	---	---	< 5 U
Di-n-butyl phthalate	UG/L	---	---	---	< 5 U
Di-n-octyl phthalate	UG/L	---	---	---	< 5 U
Dinoseb	UG/L	---	---	---	< 5 U
Disulfoton	UG/L	---	---	---	< 47 U
d-Limonene	UG/L	---	---	---	< 5 U
Fluoranthene	UG/L	---	---	---	< 0.5 U
Fluorene	UG/L	---	---	---	< 0.5 U
Hexachlorobenzene	UG/L	---	---	---	< 0.5 U
Hexachlorobutadiene	UG/L	---	---	---	< 0.9 U
Hexachlorocyclopentadiene	UG/L	---	---	---	< 14 U
Hexachloroethane	UG/L	---	---	---	< 5 U
Indeno (1,2,3-cd) pyrene	UG/L	---	---	---	< 0.5 U
Isophorone	UG/L	---	---	---	< 0.9 U
Naphthalene	UG/L	---	---	---	< 0.5 U

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER M

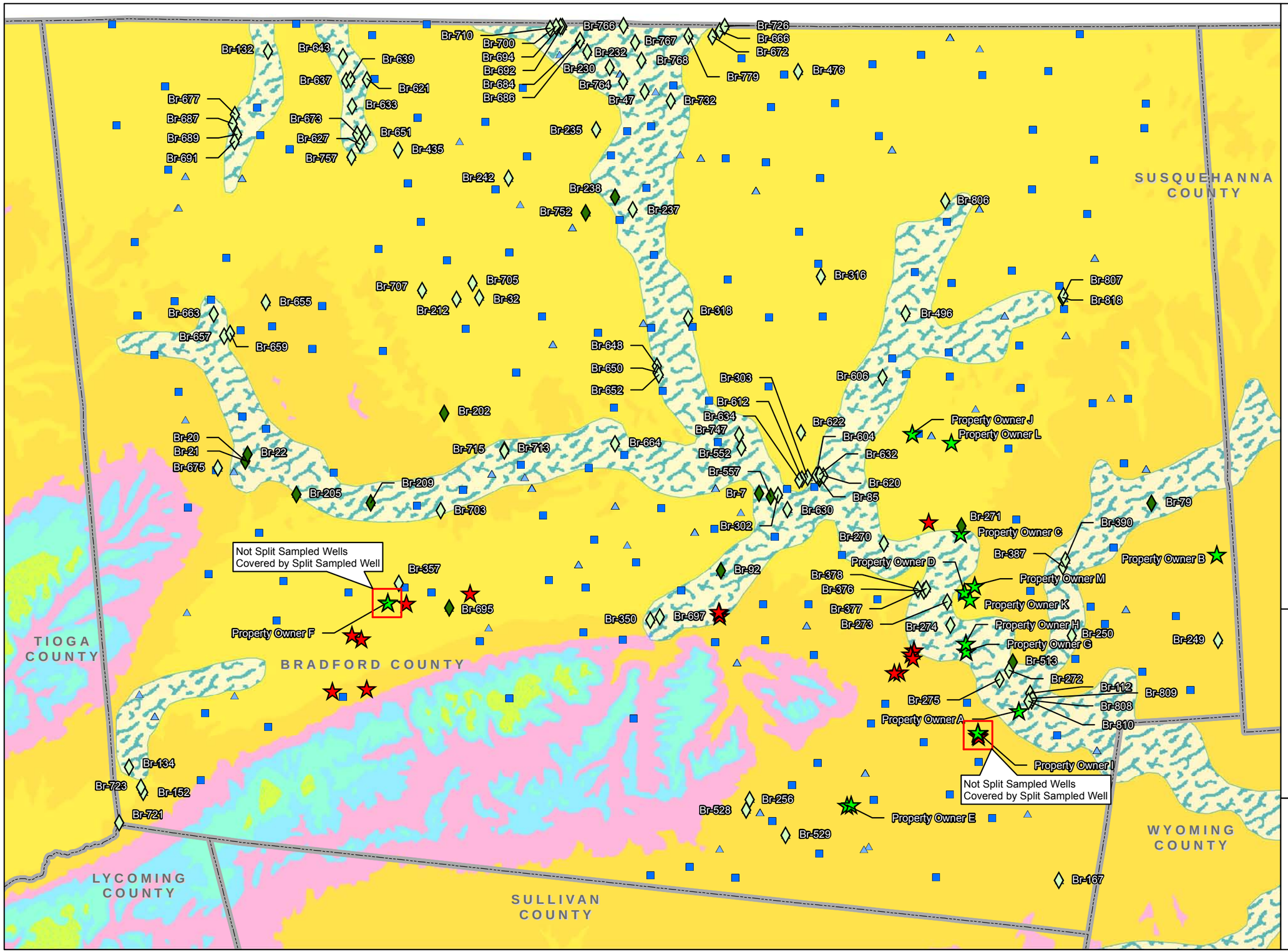
Property Owner		PROPERTY OWNER M	PROPERTY OWNER M	PROPERTY OWNER M	PROPERTY OWNER M
Location Description		THE WELL IS LOCATED NORTH OF THE HOUSE.	THE WELL IS LOCATED NORTH OF THE HOUSE.	THE WELL IS LOCATED NORTH OF THE HOUSE.	THE WELL IS LOCATED NORTH OF THE HOUSE.
Source Type		WELL	WELL	WELL	WELL
Well Depth		440	440	440	440
Sampled Before Treatment?		NA	Pre-Treatment	Pre-Treatment	Pre-Treatment
Sample ID		NTA0325-01062010-1605	1202201012501	0411201112403	1028201120202
Parameter and units	Sample Date	1/6/2010 (Baseline)	12/2/2010	4/11/2011	10/28/2011
Nitrobenzene	UG/L	---	---	---	< 0.9 U
N-Nitrosodiethylamine	UG/L	---	---	---	< 0.9 U
N-Nitrosodimethylamine	UG/L	---	---	---	< 5 U
N-Nitrosodi-n-butylamine	UG/L	---	---	---	< 5 U
N-Nitrosodi-n-propylamine	UG/L	---	---	---	< 0.9 U
N-Nitrosodiphenylamine	UG/L	---	---	---	< 0.9 U
N-Nitrosomethylethylamine	UG/L	---	---	---	< 5 U
Parathion-ethyl	UG/L	---	---	---	< 5 U
Parathion-methyl	UG/L	---	---	---	< 5 U
Pentachlorobenzene	UG/L	---	---	---	< 0.9 U
Pentachlorophenol	UG/L	---	---	---	< 5 UJ
Phenanthrene	UG/L	---	---	---	< 0.5 U
Phenol	UG/L	---	---	---	< 0.9 U
Phorate	UG/L	---	---	---	< 0.9 U
Pronamide	UG/L	---	---	---	< 0.9 U
Pyrene	UG/L	---	---	---	< 0.5 U
Pyridine	UG/L	---	---	---	< 5 U
Squalene	UG/L	---	---	---	< 5 UJ
Terbufos	UG/L	---	---	---	< 5 U
Terpineol	UG/L	---	---	---	< 5 U
Tributoxyethyl phosphate	UG/L	---	---	---	< 5 UJ
Trifluralin	UG/L	---	---	---	< 5 U
TICs					
1,2,3-Trimethylbenzene	UG/L	---	---	---	---
Volatile Organics					
1,1,1-Trichloroethane	UG/L	---	---	---	< 1.00 U
1,1,2-Trichloroethane	UG/L	---	---	---	< 1.00 U
1,1-Dichloroethane	UG/L	---	---	---	< 1.00 U
1,1-Dichloroethene	UG/L	---	---	---	< 1.00 U
1,2,3-Trimethylbenzene	UG/L	---	---	---	< 1.00 U
1,2,4-Trichlorobenzene	UG/L	---	---	---	---
1,2,4-Trimethylbenzene	UG/L	---	---	---	< 1.00 U
1,2-Dibromo-3-chloropropane	UG/L	---	---	---	< 0.1020 U
1,2-Dichlorobenzene	UG/L	---	---	---	< 1.00 U
1,2-Dichloroethane	UG/L	---	---	---	< 1.00 U
1,2-Dichloropropane	UG/L	---	---	---	---
1,3,5-Trimethylbenzene	UG/L	---	---	---	< 1.00 U
1,3-Dichlorobenzene	UG/L	---	---	---	< 1.00 U
1,4-Dichlorobenzene	UG/L	---	---	---	< 1.00 U
Acetone	UG/L	---	---	---	< 50.0 U
Benzene	UG/L	< 0.500 U	< 0.500 U	---	< 1.00 U
Carbon disulfide	UG/L	---	---	---	< 1.00 U
Carbon Tetrachloride	UG/L	---	---	---	< 1.00 U
Chlorobenzene	UG/L	---	---	---	< 1.00 U
Chloroform	UG/L	---	---	---	< 1.00 U
cis-1,2-Dichloroethene	UG/L	---	---	---	< 1.00 U
Diisopropyl Ether	UG/L	---	---	---	< 1.00 U
Ethanol	UG/L	---	---	---	< 100 U
Ethyl tert-Butyl Ether	UG/L	---	---	---	< 1.00 U
Ethylbenzene	UG/L	< 0.500 U	< 0.500 U	---	< 1.00 U
Hexachlorobutadiene	UG/L	---	---	---	< 0.9 U
Isopropyl alcohol	UG/L	---	---	---	< 50.0 U
Isopropylbenzene	UG/L	---	---	---	< 1.00 U
m,p-Xylene	UG/L	---	---	---	< 2.00 U
Methoxychlor	UG/L	---	---	---	< 0.0476 U
Methyl tert-Butyl Ether	UG/L	---	---	---	< 1.00 U
Methylene Chloride	UG/L	---	---	---	< 5.00 U
Naphthalene	UG/L	---	---	---	< 5.00 U
o-Xylene	UG/L	---	---	---	< 1.00 U
Styrene	UG/L	---	---	---	---

SUMMARY TABLE OF LABORATORY ANALYTICAL DATA FOR THE CHESAPEAKE SPLIT SAMPLE FROM EPA RETROSPECTIVE WELL PROPERTY OWNER M

	Property Owner	PROPERTY OWNER M	PROPERTY OWNER M	PROPERTY OWNER M	PROPERTY OWNER M
	Location Description	THE WELL IS LOCATED NORTH OF THE HOUSE.	THE WELL IS LOCATED NORTH OF THE HOUSE.	THE WELL IS LOCATED NORTH OF THE HOUSE.	THE WELL IS LOCATED NORTH OF THE HOUSE.
	Source Type	WELL	WELL	WELL	WELL
	Well Depth	440	440	440	440
	Sampled Before Treatment?	NA	Pre-Treatment	Pre-Treatment	Pre-Treatment
	Sample ID	NTA0325-01062010-1605	1202201012501	0411201112403	1028201120202
Parameter and units	Sample Date	1/6/2010 (Baseline)	12/2/2010	4/11/2011	10/28/2011
Tert-Amyl Methyl Ether	UG/L	---	---	---	< 1.00 U
Tertiary Butyl Alcohol	UG/L	---	---	---	< 10.0 U
Tetrachloroethene	UG/L	---	---	---	< 1.00 U
Tetrahydrofuran	UG/L	---	---	---	---
Toluene	UG/L	< 0.500 U	< 0.500 U	---	< 1.00 U
trans-1,2-Dichloroethene	UG/L	---	---	---	< 1.00 U
Trichloroethene	UG/L	---	---	---	< 1.00 U
Vinyl chloride	UG/L	---	---	---	< 1.00 U
Xylenes, total	UG/L	< 0.500 U	< 0.500 U	---	< 3.00 U

Notes:
U : Parameter not detected at posted limit
< : Parameter not detected at posted limit
ND : Parameter not detected
H : Parameter analyzed beyond method recommended holding time
J : Estimated value
--- : Parameter not analyzed.
B : Blank qualified
ug/L : Micrograms per liter
mg/L : Milligrams per liter
NA : Not Available
NTU : Nephelometric Turbidity Unit
umho/cm : Micromhos per centimeter
colonies/100 ml : Colonies per 100 milliliters

APPENDIX B
FIGURES



Legend

- CHK Split Samples from EPA Retrospective Study Wells
- EPA Retrospective Study Well Not Split Sampled by CHK
- Williams '98 Restricted Flow Zone Wells
- Williams '98 Unrestricted Flow Zone Wells
- NWIS Database Well Location
- NURE Database Well Location

Geologic Formation

- Catskill Formation
- Lock Haven Formation
- Huntley Mountain Formation
- Burgoon Sandstone
- Mauch Chunk Formation
- Pocono Formation
- Allegheny and Pottsville Formations, undivided
- Pottsville Formation
- Glacial Stratified Drift

N
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S

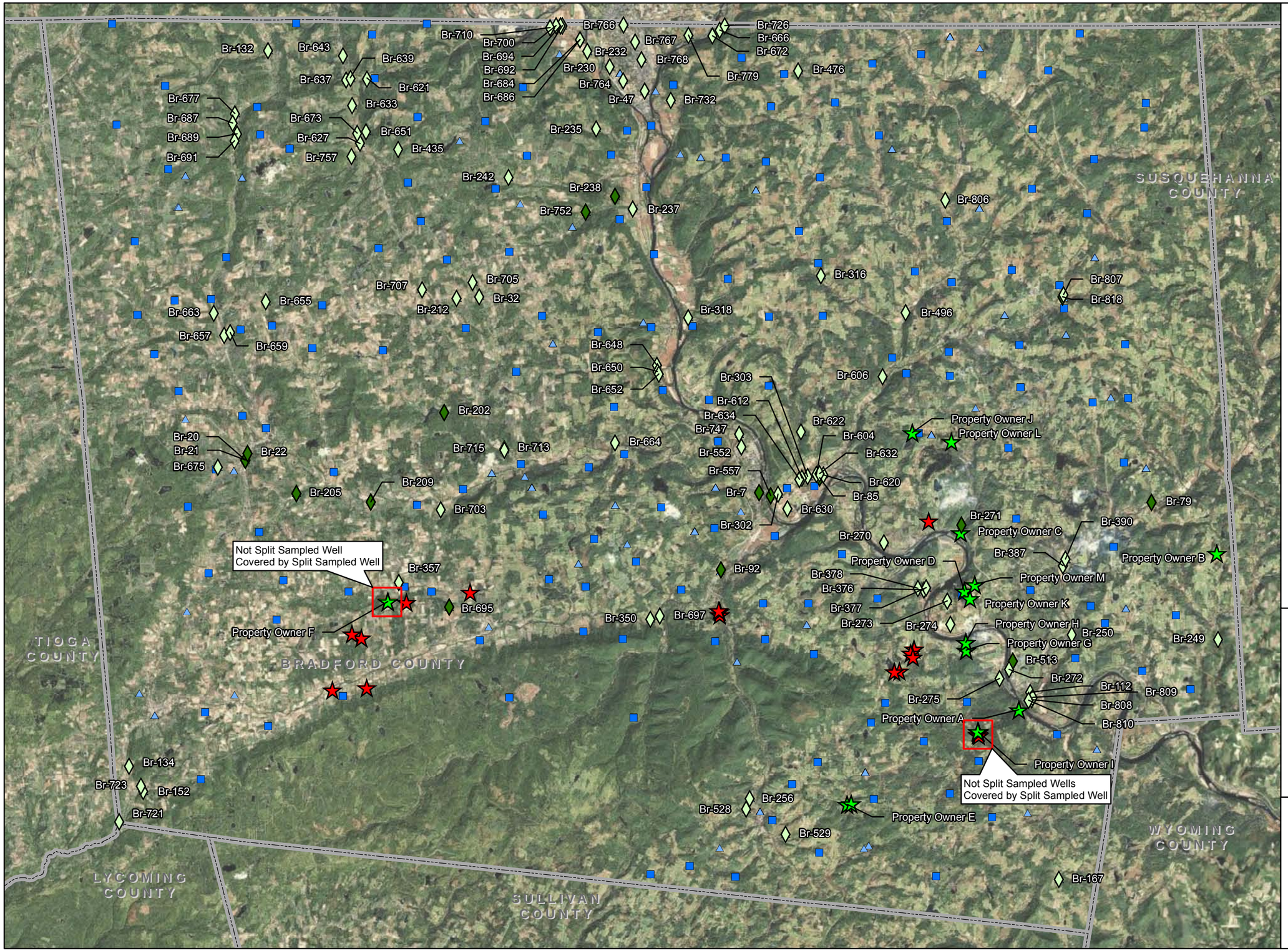
0 1 2 4 6 8
Miles

Data Source(s):
Glacial Data: PADCNR, 1997
Geologic Data: USGS PA Geological Survey, 1980
Base Map: ESRI World Street Map Service

Figure B-1
PA Glacial Deposits and Bedrock Geology with NURE, NWIS, and CHK Split Samples from EPA Retrospective Study Wells

WESTON SOLUTIONS

File: Y:\Chesapeake\Data\SpecialProjects\Wells\Glacial_Geology_11x17_pub.mxd, 4/5/2012 12:02:28 PM, zieglera



Legend

- CHK Split Samples from EPA Retrospective Study Wells
- EPA Retrospective Study Well Not Split Sampled by CHK
- Williams '98 Restricted Flow Zone Wells
- Williams '98 Unrestricted Flow Zone Wells
- NWIS Database Well Location
- NURE Database Well Location

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Data Source(s):
Base Map: ESRI Bing Aerial Imagery Service, 2011

Figure B-2
Aerial Imagery with NURE, NWIS, and CHK Split Samples from EPA Retrospective Study Wells

WESTON SOLUTIONS

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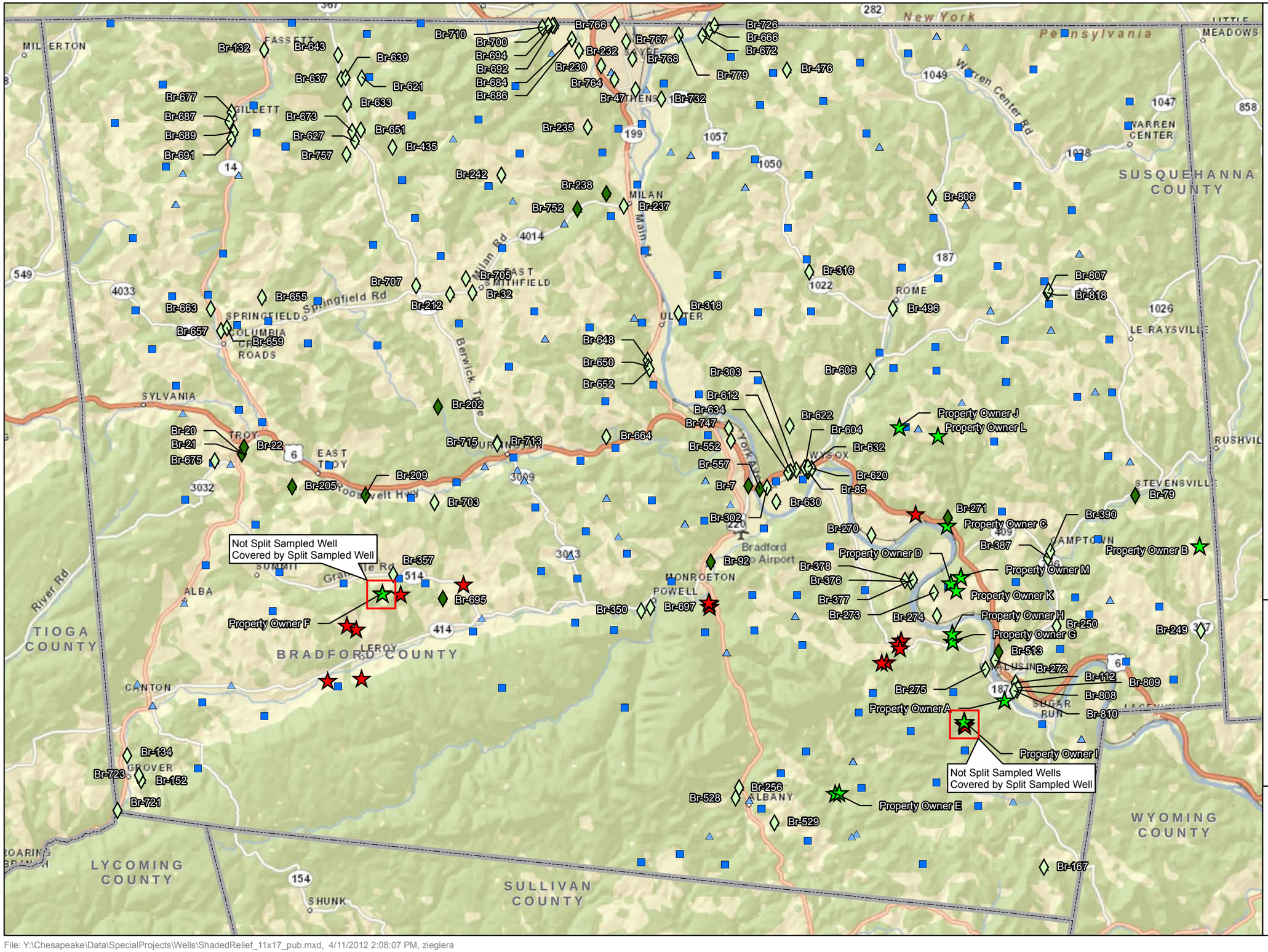

Legend

- CHK Split Samples from EPA Retrospective Study Wells
- EPA Retrospective Study Well Not Split Sampled by CHK
- Williams '98 Restricted Flow Zone Wells
- Williams '98 Unrestricted Flow Zone Wells
- NWIS Database Well Location
- NURE Database Well Location

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Miles

Data Source(s):
Base Map: ESRI World Street Map Service

Figure B-3
Shaded Relief with NURE, NWIS, and CHK Split Samples from EPA Retrospective Study Wells

WESTON SOLUTIONS

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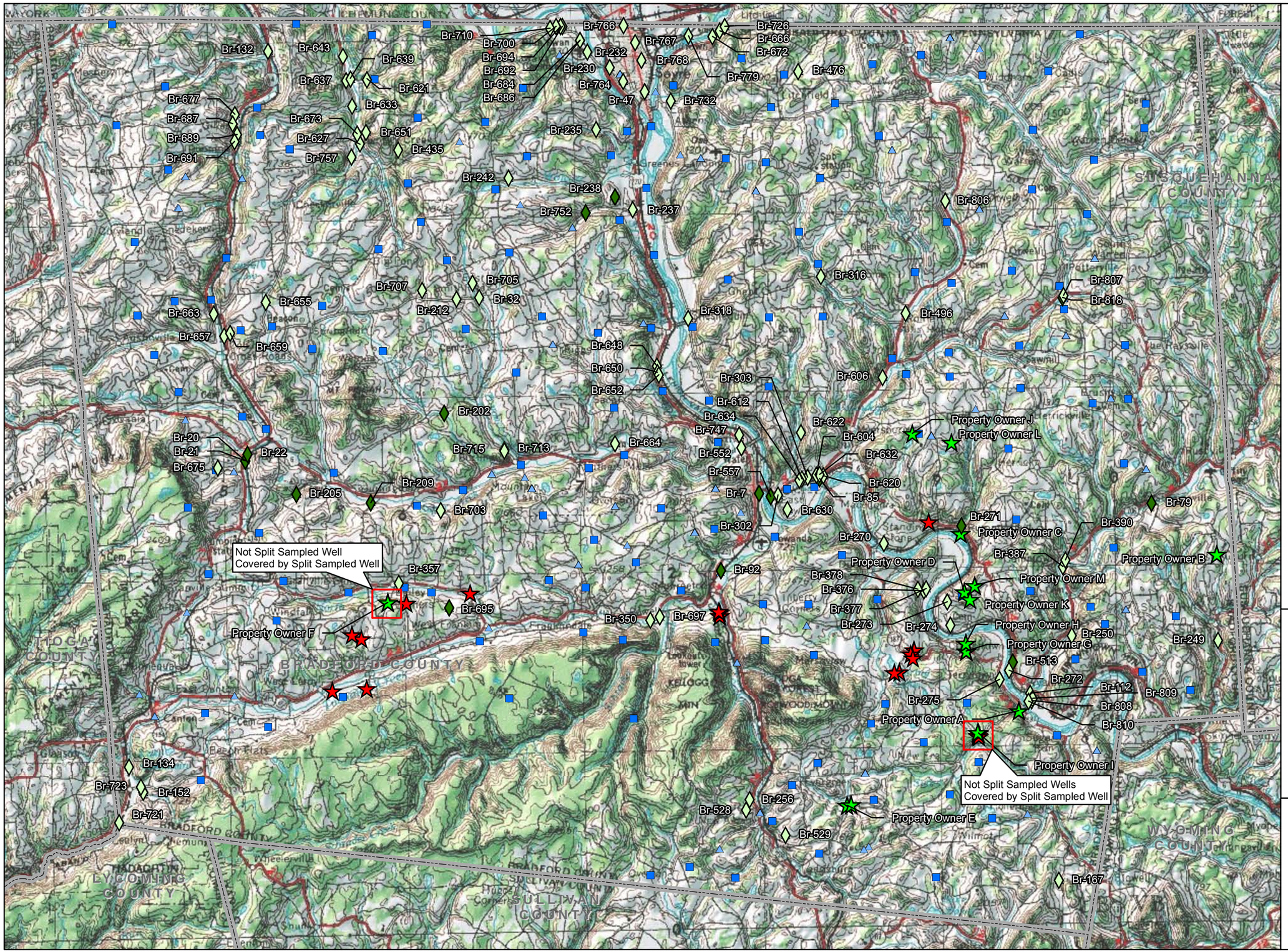

Legend

- CHK Split Samples from EPA Retrospective Study Wells
- EPA Retrospective Study Well Not Split Sampled by CHK
- Williams '98 Restricted Flow Zone Wells
- Williams '98 Unrestricted Flow Zone Wells
- NWIS Database Well Location
- NURE Database Well Location

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0 1 2 4 6 8
Miles

Data Source(s):
Base Map: ESRI USA Topo Maps Service
i-cubed eTOPO 1:250,000

Figure B-4
Topographic Map with NURE, NWIS, and CHK Split Samples from EPA Retrospective Study Wells

WESTON SOLUTIONS

File: Y:\Chesapeake\Data\SpecialProjects\Wells\Topo_11x17_pub.mxd, 4/11/2012 2:09:53 PM, zieglera

APPENDIX C
SUMMARY STATISTICS

Summary of Sample Count, Minimum, Maximum, Mean, Median, and Standard Deviation of Parameters in Various Formations using USGS NURE Historical (Sept. - Oct. 1977) Water Well Data Base for Bradford County, PA

Constituent Name	Geology	Fraction	Count	Min	Max	Mean	Median	StDev	Screening Level	Unit	ND > SC	PD > SC
Alkalinity, Total (CaCO3)	Catskill	T	51	0.3	5.36	2.30	2.20	1.14	-	mg/L	-	-
Alkalinity, Total (CaCO3)	LockHaven	T	92	0.36	5.6	2.79	2.80	1.30	-	mg/L	-	-
Alkalinity, Total (CaCO3)	StratDrift	T	17	0.55	4.4	2.34	2.25	1.17	-	mg/L	-	-
Bromide	Catskill	T	28	0.0097	2.9	0.15	0.03	0.54	-	mg/L	-	-
Bromide	LockHaven	T	53	0.0098	2.214	0.13	0.03	0.34	-	mg/L	-	-
Bromide	StratDrift	T	9	0.0148	0.3508	0.08	0.05	0.11	-	mg/L	-	-
Chloride	Catskill	T	51	3.2	87.5	11.57	7.20	13.49	250	mg/L	0	0%
Chloride	LockHaven	T	91	0.1	228.4	15.97	8.80	28.54	250	mg/L	0	0%
Chloride	StratDrift	T	17	4.2	98.6	14.98	8.20	22.43	250	mg/L	0	0%
Magnesium	LockHaven	T	1	0.44	0.44	0.44	0.44		-	mg/L	-	-
Manganese	Catskill	T	51	0.0502	0.2549	0.10	0.10	0.04	0.05	mg/L	51	100%
Manganese	LockHaven	T	90	0.0386	0.7955	0.18	0.14	0.14	0.05	mg/L	86	96%
Manganese	StratDrift	T	16	0.0463	0.2484	0.11	0.10	0.05	0.05	mg/L	15	94%
pH	Catskill	T	51	6.2	8.8	7.31	7.30	0.52	6.5-8.5	pH Units	5	10%
pH	LockHaven	T	92	6	8.8	7.25	7.25	0.54	6.5-8.5	pH Units	10	11%
pH	StratDrift	T	17	6	9.1	7.50	7.50	0.76	6.5-8.5	pH Units	4	24%
Sodium	Catskill	T	51	2.77	144.58	14.0	8.58	20.90	-	mg/L	-	-
Sodium	LockHaven	T	91	1.18	137.16	19.19	9.27	22.10	-	mg/L	-	-
Sodium	StratDrift	T	17	4.91	76.22	20.10	13.47	18.76	-	mg/L	-	-

T = Total
mg/L = Milligrams per Liter
StDev = Standard Deviation
ND > SC = Number of Detections Above Screening Criteria
PD > SC = Percent of Detections Above Screening Criteria
Screening Criteria Include MCLs, SMCLs, EPA Regional Screening Values (Tap Water), and PADEP Act 2 Values (Groundwater)

Summary of Sample Count, Minimum, Maximum, Mean, Median, and Standard Deviation of Parameters in Various Formations using USGS NWIS Historical (Pre-2007) Water Well Data Base for Bradford County, PA

Constituent Name	Geology	Fraction	Count	Min	Max	Mean	Median	StDev	Screening Level	Unit	ND > SC	PD > SC
Alkalinity, Total (CaCO3)	Catskill	T	17	42	300	145	132	61.11	-	mg/L	-	-
Alkalinity, Total (CaCO3)	LockHaven	T	21	104	350	182	170	58.62	-	mg/L	-	-
Alkalinity, Total (CaCO3)	StratDrift	T	3	70	160	127	150	49.33	-	mg/L	-	-
Alkalinity, Total (CaCO3)	Till	T	2	180	260	220	220	56.57	-	mg/L	-	-
Ammonia as N	Catskill	D	17	0.01	0.68	0.10	0.02	0.17	-	mg/L	-	-
Ammonia as N	Catskill	T	1	0.08	0.08	0.08	0.08		-	mg/L	-	-
Ammonia as N	LockHaven	D	21	0.01	3.2	0.30	0.12	0.69	-	mg/L	-	-
Ammonia as N	LockHaven	T	7	0.01	1.87	0.44	0.23	0.64	-	mg/L	-	-
Ammonia as N	StratDrift	D	3	0.01	0.05	0.02	0.01	0.02	-	mg/L	-	-
Ammonia as N	StratDrift	T	5	0.01	0.32	0.13	0.15	0.12	-	mg/L	-	-
Ammonia as N	Till	D	2	0.1	0.37	0.24	0.24	0.19	-	mg/L	-	-
Ammonia as N	Till	T	2	0.06	0.09	0.08	0.08	0.02	-	mg/L	-	-
Arsenic	Catskill	D	1	0.008	0.008	0.01	0.01		0.000045	mg/L	1	100%
Arsenic	Catskill	T	3	0.004	0.0053	0	0	0	0.000045	mg/L	3	100%
Arsenic	LockHaven	D	4	0.022	0.178	0.07	0.03	0.07	0.000045	mg/L	4	100%
Arsenic	LockHaven	T	5	0.009	0.117	0.04	0.04	0.04	0.000045	mg/L	5	100%
Arsenic	StratDrift	D	1	0.003	0.003	0	0		0.000045	mg/L	1	100%
Arsenic	StratDrift	T	7	0.004	0.072	0.03	0.01	0.03	0.000045	mg/L	7	100%
Arsenic	Till	D	1	0.009	0.009	0.01	0.01		0.000045	mg/L	1	100%
Arsenic	Till	T	2	0.023	0.026	0.02	0.02	0.00	0.000045	mg/L	2	100%
Barium	LockHaven	T	10	0.2	98	11.94	0.45	30.69	-	mg/L	-	-
Barium	StratDrift	D	1	0.05	0.05	0.05	0.05		-	mg/L	-	-
Barium	StratDrift	T	15	0.1	3.9	0.63	0.20	1.02	-	mg/L	-	-
Barium	Till	T	3	0.3	1.9	1.07	1.0	0.80	-	mg/L	-	-
Calcium	Catskill	D	19	2.9	135	42.42	36	34.33	-	mg/L	-	-
Calcium	LockHaven	D	29	10	235	56.72	44	45.84	-	mg/L	-	-
Calcium	LockHaven	T	14	8.2	349	66.41	36.20	86.42	-	mg/L	-	-
Calcium	StratDrift	D	9	20	101	50	48	26.42	-	mg/L	-	-
Calcium	StratDrift	T	39	0.5	199	46.89	40.40	34.84	-	mg/L	-	-
Calcium	Till	D	4	13	69	45.35	49.70	24.15	-	mg/L	-	-
Calcium	Till	T	11	13.8	59.9	37.05	35.50	12.99	-	mg/L	-	-
Chloride	Catskill	D	20	2	408	43.38	12	89.99	250	mg/L	1	5%
Chloride	LockHaven	D	43	1	5050	318	6	940	250	mg/L	7	16%
Chloride	StratDrift	D	43	1	224	28.95	12	47.66	250	mg/L	0	0%
Chloride	Till	D	14	2	336	55.36	6.50	116	250	mg/L	2	14%
Chromium	Catskill	D	6	0.01	0.02	0.01	0.01	0	-	mg/L	-	-
Chromium	LockHaven	D	8	0.01	0.02	0.01	0.01	0.01	-	mg/L	-	-
Chromium	LockHaven	T	7	0.01	0.12	0.03	0.01	0.04	-	mg/L	-	-
Chromium	StratDrift	D	3	0.01	0.03	0.02	0.01	0.01	-	mg/L	-	-
Chromium	StratDrift	T	12	0.01	0.11	0.03	0.01	0.04	-	mg/L	-	-
Iron	Catskill	D	20	0.04	5.6	0.62	0.12	1.30	0.3	mg/L	8	40%
Iron	LockHaven	D	23	0.04	3.4	0.88	0.56	0.98	0.3	mg/L	14	61%
Iron	LockHaven	T	20	0.03	1.08	0.37	0.25	0.32	0.3	mg/L	7	35%
Iron	StratDrift	D	6	0.01	12.9	2.41	0.25	5.15	0.3	mg/L	3	50%
Iron	StratDrift	T	38	0.01	56.4	2.56	0.36	9.19	0.3	mg/L	21	55%
Iron	Till	D	2	0.5	15.9	8.20	8.20	10.89	0.3	mg/L	2	100%
Iron	Till	T	12	0.1	3.55	1.28	0.77	1.14	0.3	mg/L	9	75%
Lead	LockHaven	D	1	0.1	0.1	0.10	0.10		0.005	mg/L	1	100%
Lead	StratDrift	T	1	0.5	0.5	0.50	0.50		0.005	mg/L	1	100%
Lithium	StratDrift	D	1	0.05	0.05	0.05	0.05		0.031	mg/L	1	100%

Summary of Sample Count, Minimum, Maximum, Mean, Median, and Standard Deviation of Parameters in Various Formations using USGS NWIS Historical (Pre-2007) Water Well Data Base for Bradford County, PA

Constituent Name	Geology	Fraction	Count	Min	Max	Mean	Median	StDev	Screening Level	Unit	ND > SC	PD > SC
Magnesium	Catskill	D	18	0.6	46	10.38	5.75	12.27	-	mg/L	-	-
Magnesium	LockHaven	D	29	2.4	35	13.84	12	8.78	-	mg/L	-	-
Magnesium	LockHaven	T	14	2.4	45.8	13.97	8.30	13.62	-	mg/L	-	-
Magnesium	StratDrift	D	10	4.3	27	13.03	9.70	8.31	-	mg/L	-	-
Magnesium	StratDrift	T	38	0.1	39.3	9.03	8.10	6.42	-	mg/L	-	-
Magnesium	Till	D	4	2.7	22	12.00	11.65	7.97	-	mg/L	-	-
Magnesium	Till	T	11	3.5	16.4	8.73	8.60	4.35	-	mg/L	-	-
Manganese	Catskill	D	15	0.01	0.3	0.09	0.03	0.10	0.05	mg/L	7	47%
Manganese	LockHaven	D	17	0.01	2.6	0.29	0.09	0.61	0.05	mg/L	11	65%
Manganese	LockHaven	T	17	0.02	0.41	0.13	0.10	0.10	0.05	mg/L	13	76%
Manganese	StratDrift	D	4	0.25	2.36	0.91	0.52	0.98	0.05	mg/L	4	100%
Manganese	StratDrift	T	29	0.01	7.37	0.46	0.14	1.35	0.05	mg/L	23	79%
Manganese	Till	D	2	0.02	0.41	0.22	0.22	0.28	0.05	mg/L	1	50%
Manganese	Till	T	9	0.08	0.69	0.34	0.26	0.23	0.05	mg/L	9	100%
Nitrate as N	Catskill	D	19	0.02	2.4	0.48	0.09	0.77	-	mg/L	-	-
Nitrate as N	LockHaven	D	42	0.019	4.4	0.36	0.04	0.85	-	mg/L	-	-
Nitrate as N	LockHaven	T	2	0.48	8.35	4.42	4.42	5.56	-	mg/L	-	-
Nitrate as N	StratDrift	D	41	0.009	13.9	1.72	0.41	2.95	-	mg/L	-	-
Nitrate as N	Till	D	10	0.019	1.55	0.40	0.14	0.53	-	mg/L	-	-
Nitrate/Nitrite as N	LockHaven	D	19	0.02	4.4	0.54	0.04	1.18	-	mg/L	-	-
Nitrate/Nitrite as N	StratDrift	D	35	0.01	13.9	1.53	0.41	2.69	-	mg/L	-	-
Nitrate/Nitrite as N	Till	D	8	0.02	1.55	0.49	0.22	0.56	-	mg/L	-	-
Potassium	Catskill	D	17	0.2	13	3.30	3	2.92	-	mg/L	-	-
Potassium	LockHaven	D	22	2	25	3.79	3	4.79	-	mg/L	-	-
Potassium	LockHaven	T	20	0.6	19.8	3.21	1.45	4.49	-	mg/L	-	-
Potassium	StratDrift	D	5	1.1	2	1.74	2	0.40	-	mg/L	-	-
Potassium	StratDrift	T	42	0.4	6	1.31	1.05	0.99	-	mg/L	-	-
Potassium	Till	D	2	2	4	3	3	1.41	-	mg/L	-	-
Potassium	Till	T	13	0.4	3.1	1.28	1.10	0.71	-	mg/L	-	-
Sodium	Catskill	D	17	4	829	85.09	23	197	-	mg/L	-	-
Sodium	LockHaven	D	22	6.1	2000	126	23	421	-	mg/L	-	-
Sodium	LockHaven	T	20	3.2	2510	248	35.20	560	-	mg/L	-	-
Sodium	StratDrift	D	5	6.4	21	12.36	11	6.12	-	mg/L	-	-
Sodium	StratDrift	T	42	2.1	112	25.52	11.35	28.68	-	mg/L	-	-
Sodium	Till	D	2	16	143	79.50	79.50	89.80	-	mg/L	-	-
Sodium	Till	T	13	5.3	252	61.57	27	79.34	-	mg/L	-	-
Strontium	LockHaven	T	13	0.08	80	7.68	0.45	22.05	-	mg/L	-	-
Strontium	StratDrift	T	34	0.02	0.92	0.20	0.12	0.21	-	mg/L	-	-
Strontium	Till	T	11	0.03	0.98	0.31	0.18	0.32	-	mg/L	-	-
Sulfate	Catskill	D	18	2	250	25.56	12.50	56.55	-	mg/L	-	-
Sulfate	LockHaven	D	40	1	210	28.40	15	36.58	-	mg/L	-	-
Sulfate	StratDrift	D	47	8	77	26.17	25	14.90	-	mg/L	-	-
Sulfate	Till	D	15	10	85	29.27	25	19.52	-	mg/L	-	-

Summary of Sample Count, Minimum, Maximum, Mean, Median, and Standard Deviation of Parameters in Various Formations using USGS NWIS Historical (Pre-2007) Water Well Data Base for Bradford County, PA

Constituent Name	Geology	Fraction	Count	Min	Max	Mean	Median	StDev	Screening Level	Unit	ND > SC	PD > SC
Total Dissolved Solids	Catskill	D	35	76	4050	362	212	661	500	mg/L	4	11%
Total Dissolved Solids	LockHaven	D	65	134	9200	676	246	1504	500	mg/L	14	22%
Total Dissolved Solids	StratDrift	D	52	64	1130	268	221	181	500	mg/L	3	6%
Total Dissolved Solids	Till	D	17	112	846	360	266	201	500	mg/L	3	18%

T = Total
D = Dissolved
mg/L = Milligrams per Liter
StDev = Standard Deviation
ND > SC = Number of Detections Above Screening Criteria
PD > SC = Percent of Detections Above Screening Criteria
Screening Criteria Include MCLs, SMCLs, EPA Regional Screening Values (Tap Water), and PADEP Act 2 Values (Groundwater)

Summary of Sample Count, Minimum, Maximum, Mean, Median, and Standard Deviation of Parameters in Various Formations using Williams 1998 Historical (1935-1986) Water Well Data Base for Bradford County, PA

Constituent Name	Geology	Fraction	Count	Min	Max	Mean	Median	StDev	Screening Level	Units	ND > SC	PD > SC
Aluminum	Catskill	D	9	0.05	3.8	1.22	0.74	1.31	0.2	mg/l	6	67%
Aluminum	Lockhaven	D	19	0.05	1.3	0.21	0.14	0.28	0.2	mg/l	5	26%
Aluminum	RestrictedFlow	D	6	0.02	0.16	0.08	0.07	0.05	0.2	mg/l	0	0%
Aluminum	StratifiedDrift	D	29	0.04	1.55	0.18	0.10	0.29	0.2	mg/l	4	14%
Aluminum	Till	D	5	0.05	0.2	0.09	0.06	0.06	0.2	mg/l	0	0%
Arsenic	Catskill	D	1	0.008	0.008	0.01	0.01		0.000045	mg/l	1	100%
Arsenic	Lockhaven	D	3	0.005	0.025	0.02	0.02	0.01	0.000045	mg/l	3	100%
Arsenic	RestrictedFlow	D	3	0.009	0.067	0.03	0.02	0.03	0.000045	mg/l	3	100%
Arsenic	StratifiedDrift	D	7	0.004	0.072	0.02	0.01	0.02	0.000045	mg/l	7	100%
Arsenic	Till	D	2	0.009	0.026	0.02	0.02	0.01	0.000045	mg/l	2	100%
Barium	Lockhaven	D	8	0.03	0.46	0.23	0.20	0.15	-	mg/l	-	-
Barium	RestrictedFlow	D	7	0.56	98	15.40	1.62	36.44	-	mg/l	-	-
Barium	StratifiedDrift	D	32	0.02	0.62	0.16	0.12	0.14	-	mg/l	-	-
Barium	Till	D	3	0.06	0.34	0.16	0.09	0.15	-	mg/l	-	-
Calcium	Catskill	D	11	2.9	54	35.26	39.00	13.97	-	mg/L	-	-
Calcium	Lockhaven	D	20	8.2	87	42.51	40.50	21.76	-	mg/L	-	-
Calcium	RestrictedFlow	D	10	10	235	64.90	29.00	76.35	-	mg/L	-	-
Calcium	StratifiedDrift	D	52	9.2	199	47.89	40.50	31.67	-	mg/L	-	-
Calcium	Till	D	12	14	95	48.42	46.50	20.82	-	mg/L	-	-
Cadium	Lockhaven	D	4	0.001	0.002	0	0	0	-	mg/l	-	-
Cadium	StratifiedDrift	D	10	0.001	0.001	0	0		-	mg/l	-	-
Cadium	Till	D	1	0.001	0.001	0	0	0	-	mg/l	-	-
Chloride	Catskill	D	12	2	74	25.13	13	24.33	250	mg/L	0	0%
Chloride	Lockhaven	D	18	1	132	16.56	5.50	30.81	250	mg/L	0	0%
Chloride	RestrictedFlow	D	11	125	3500	693	336	979	250	mg/L	7	64%
Chloride	StratifiedDrift	D	47	1	224	27.19	14	43.32	250	mg/L	0	0%
Chloride	Till	D	11	2	15	5.45	4	4.61	250	mg/L	0	0%
Chromium	Catskill	D	4	0.01	0.01	0.01	0.01	0	-	mg/l	-	-
Chromium	Lockhaven	D	6	0.01	0.12	0.03	0.01	0.04	-	mg/l	-	-
Chromium	RestrictedFlow	D	2	0.01	0.02	0.02	0.02	0.01	-	mg/l	-	-
Chromium	StratifiedDrift	D	14	0.01	0.11	0.03	0.01	0.04	-	mg/l	-	-
Chromium	Till	D	1	0.01	0.01	0.01	0.01		-	mg/l	-	-
Iron	Catskill	D	12	40	5600	833	315	1634	0.3	mg/L	6	50%
Iron	Lockhaven	D	20	40	1400	393	245	359	0.3	mg/L	8	40%
Iron	RestrictedFlow	D	9	150	3550	1293	670	1403	0.3	mg/L	6	67%
Iron	StratifiedDrift	D	47	10	11200	1043	340	2011	0.3	mg/L	24	51%
Iron	Till	D	11	40	15900	2417	770	4572	0.3	mg/L	9	82%
Bicarbonate Alk (CaCO3)	Catskill	D	3	148	172	159	158	12.06	-	mg/L	-	-
Bicarbonate Alk (CaCO3)	Lockhaven	D	12	82	292	165	156	75.79	-	mg/L	-	-
Bicarbonate Alk (CaCO3)	RestrictedFlow	D	9	184	258	214	208	24.80	-	mg/L	-	-
Bicarbonate Alk (CaCO3)	StratifiedDrift	D	50	20	308	133	124	68.48	-	mg/L	-	-
Bicarbonate Alk (CaCO3)	Till	D	11	62	240	168	170	54.60	-	mg/L	-	-
Potassium	Catskill	D	10	0.2	5	2.49	2.50	1.54	-	mg/L	-	-
Potassium	Lockhaven	D	20	0.58	7	2.18	2	1.56	-	mg/L	-	-
Potassium	RestrictedFlow	D	9	1.7	25	5.80	3.10	7.47	-	mg/L	-	-
Potassium	StratifiedDrift	D	52	0.38	6	1.25	1.05	0.88	-	mg/L	-	-
Potassium	Till	D	12	0.8	3.2	1.33	1.15	0.68	-	mg/L	-	-

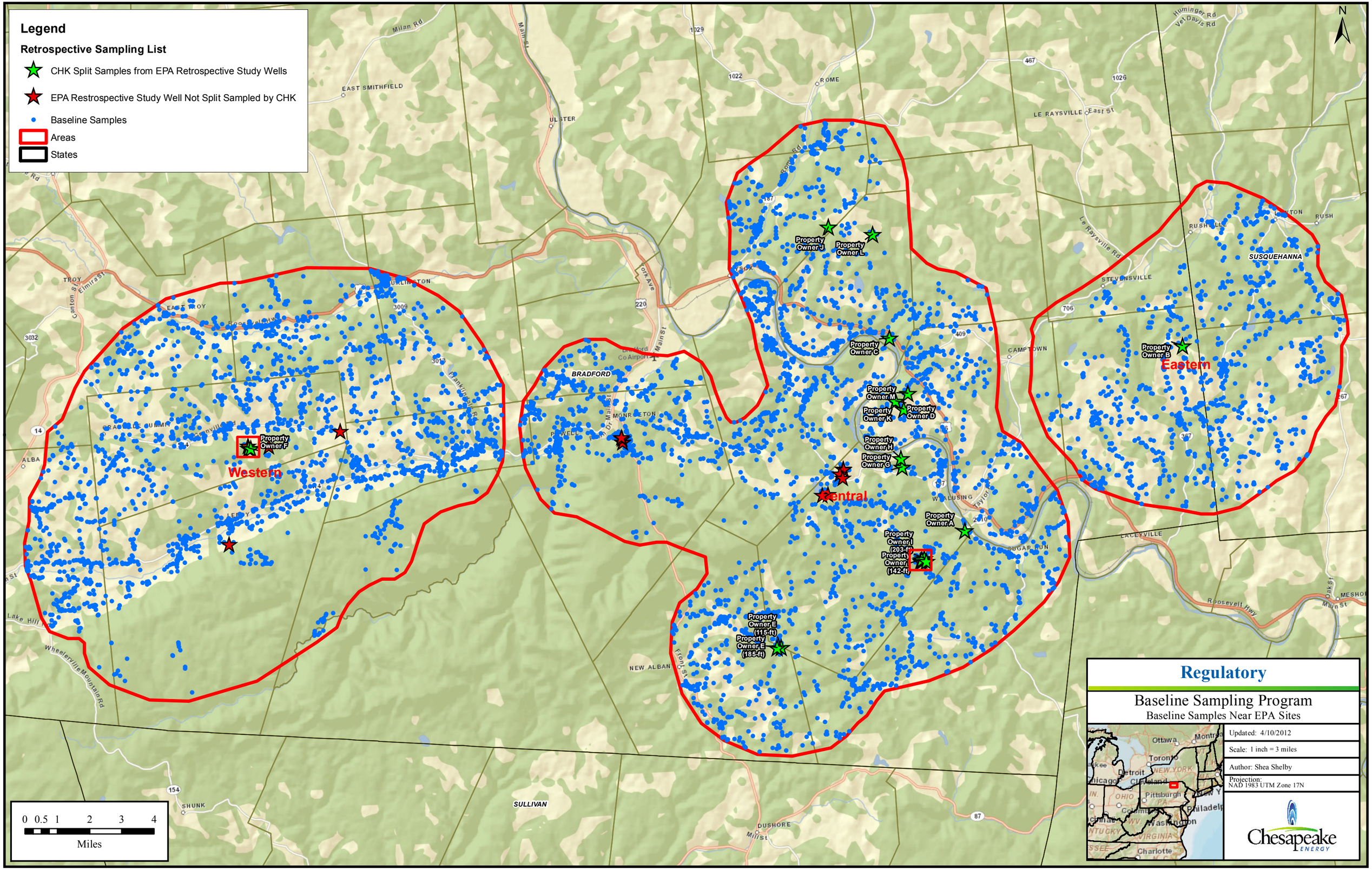
Summary of Sample Count, Minimum, Maximum, Mean, Median, and Standard Deviation of Parameters in Various Formations using Williams 1998 Historical (1935-1986) Water Well Data Base for Bradford County, PA

Constituent Name	Geology	Fraction	Count	Min	Max	Mean	Median	StDev	Screening Level	Units	ND > SC	PD > SC
Magnesium	Catskill	D	11	0.6	12	6.77	6	3.49	-	mg/L	-	-
Magnesium	Lockhaven	D	20	2.4	41	11.61	10	9.06	-	mg/L	-	-
Magnesium	RestrictedFlow	D	10	2.4	33	12.10	8.05	11.07	-	mg/L	-	-
Magnesium	StratifiedDrift	D	52	2.1	39	9.90	8.10	6.74	-	mg/L	-	-
Magnesium	Till	D	12	3.5	22	10.90	12	5.42	-	mg/L	-	-
Manganese	Catskill	D	10	0.01	0.3	0.08	0.06	0.09	0.05	mg/l	5	50%
Manganese	Lockhaven	D	17	0.01	2.6	0.26	0.10	0.61	0.05	mg/l	11	65%
Manganese	RestrictedFlow	D	8	0.03	0.44	0.12	0.07	0.14	0.05	mg/l	5	63%
Manganese	StratifiedDrift	D	35	0.01	1.03	0.24	0.14	0.27	0.05	mg/l	27	77%
Manganese	Till	D	7	0.13	0.69	0.38	0.35	0.23	0.05	mg/l	7	100%
Sodium	Catskill	D	10	5	132	41.95	18.50	47.44	-	mg/L	-	-
Sodium	Lockhaven	D	20	3.2	165	38.65	22	43.78	-	mg/L	-	-
Sodium	RestrictedFlow	D	10	90	2000	431	249	565	-	mg/L	-	-
Sodium	StratifiedDrift	D	52	2.1	112	20.55	8.95	25	-	mg/L	-	-
Sodium	Till	D	12	5.3	89	28.03	23	23	-	mg/L	-	-
Nickel	Catskill	D	3	0.01	0.02	0.02	0.02	0.01	-	mg/l	-	-
Nickel	Lockhaven	D	10	0.01	0.03	0.02	0.01	0.01	-	mg/l	-	-
Nickel	RestrictedFlow	D	6	0.01	0.03	0.02	0.02	0.01	-	mg/l	-	-
Nickel	StratifiedDrift	D	18	0.01	0.14	0.02	0.02	0.03	-	mg/l	-	-
Nickel	Till	D	2	0.02	0.02	0.02	0.02	0.00	-	mg/l	-	-
Nitrate-N	Catskill	D	7	0.04	2.38	0.69	0.42	0.83	-	mg/L	-	-
Nitrate-N	Lockhaven	D	13	0.02	46	4.28	0.22	12.61	-	mg/L	-	-
Nitrate-N	RestrictedFlow	D	2	0.02	0.04	0.03	0.03	0.01	-	mg/L	-	-
Nitrate-N	StratifiedDrift	D	36	0.01	13.9	1.68	0.90	2.54	-	mg/L	-	-
Nitrate-N	Till	D	7	0.1	6.38	1.46	0.82	2.23	-	mg/L	-	-
Lead	Catskill	D	4	0.006	0.016	0.01	0.01	0	0.005	mg/l	4	100%
Lead	Lockhaven	D	6	0.005	0.02	0.01	0.01	0.01	0.005	mg/l	4	67%
Lead	RestrictedFlow	D	4	0.005	0.007	0.01	0.01	0	0.005	mg/l	3	75%
Lead	StratifiedDrift	D	15	0.004	0.023	0.01	0.01	0.01	0.005	mg/l	13	87%
Lead	Till	D	5	0.004	0.031	0.01	0.01	0.01	0.005	mg/l	2	40%
pH	Catskill	D	11	6.5	8.8	7.51	7.40	0.61	6.5-8.5	pH units	1	9%
pH	Lockhaven	D	20	5.2	8.6	7.17	7.15	0.70	6.5-8.5	pH units	2	10%
pH	RestrictedFlow	D	8	6.6	8.4	7.80	8.10	0.65	6.5-8.5	pH units	0	0%
pH	StratifiedDrift	D	52	6.2	8.6	7.28	7.20	0.55	6.5-8.5	pH units	3	6%
pH	Till	D	12	6.6	8.1	7.61	7.80	0.52	6.5-8.5	pH units	0	0%
Sulfate	Catskill	D	11	5	35	13.45	10	9.07	-	mg/L	-	-
Sulfate	Lockhaven	D	19	10	85	28.53	20	23.29	-	mg/L	-	-
Sulfate	RestrictedFlow	D	8	1	22	9.63	10.50	6.97	-	mg/L	-	-
Sulfate	StratifiedDrift	D	52	10	77	26.17	23.50	14.51	-	mg/L	-	-
Sulfate	Till	D	12	10	55	28.50	29	12.18	-	mg/L	-	-
Strontium	Lockhaven	D	9	0.08	1.58	0.46	0.29	0.49	-	mg/l	-	-
Strontium	RestrictedFlow	D	8	0.14	80	12.45	1.04	27.68	-	mg/l	-	-
Strontium	StratifiedDrift	D	37	0.02	0.92	0.18	0.12	0.18	-	mg/l	-	-
Strontium	Till	D	9	0.03	0.52	0.17	0.11	0.14	-	mg/l	-	-
TDS	Catskill	D	10	100	680	263	208	177	500	mg/L	1	10%
TDS	Lockhaven	D	20	142	512	275	227	120	500	mg/L	1	5%
TDS	RestrictedFlow	D	9	400	6100	1510	760	1831	500	mg/L	7	78%
TDS	StratifiedDrift	D	52	64	1130	260	229	174	500	mg/L	2	4%
TDS	Till	D	12	112	620	308	263	146	500	mg/L	2	17%

Summary of Sample Count, Minimum, Maximum, Mean, Median, and Standard Deviation of Parameters in Various Formations using Williams 1998 Historical (1935-1986) Water Well Data Base for Bradford County, PA

Constituent Name	Geology	Fraction	Count	Min	Max	Mean	Median	StDev	Screening Level	Units	ND > SC	PD > SC
Zinc	Catskill	D	10	0.01	1.23	0.30	0.04	0.48	-	mg/l	-	-
Zinc	Lockhaven	D	20	0.01	0.08	0.02	0.02	0.02	-	mg/l	-	-
Zinc	RestrictedFlow	D	8	0.01	0.67	0.15	0.04	0.24	-	mg/l	-	-
Zinc	StratifiedDrift	D	46	0.01	0.47	0.05	0.03	0.08	-	mg/l	-	-
Zinc	Till	D	12	0.01	0.11	0.04	0.03	0.03	-	mg/l	-	-

D = Dissolved
ug/L = Micrograms per Liter
mg/L = Milligrams per Liter
StDev = Standard Deviation
ND > SC = Number of Detections Above Screening Criteria
PD > SC = Percent of Detections Above Screening Criteria
Screening Criteria Include MCLs, SMCLs, EPA Regional Screening Values (Tap Water), and PADEP Act 2 Values (Groundwater)


Legend
Retrospective Sampling List
CHK Split Samples from EPA Retrospective Study Wells
EPA Restrospective Study Well Not Split Sampled by CHK
Baseline Samples
Areas
States
Western
Central
Eastern
Property Owner F
Property Owner J
Property Owner L
Property Owner C
Property Owner M
Property Owner K
Property Owner D
Property Owner H
Property Owner G
Property Owner A
Property Owner I (203-ft)
Property Owner I (142-ft)
Property Owner E (115-ft)
Property Owner E (185-ft)
Property Owner B
BRADFORD
SUSQUEHANNA
SULLIVAN
0 0.5 1 2 3 4
Miles
N
Regulatory
Baseline Sampling Program
Baseline Samples Near EPA Sites
Updated: 4/10/2012
Scale: 1 inch = 3 miles
Author: Shea Shelby
Projection: NAD 1983 UTM Zone 17N
Chesapeake ENERGY

Regional Baseline Summary, Groundwater (WESTERN)

Southside Road Area

Sample Date Range	8/11/2009	1/9/2012
Property Owners	1004	
Unique sources tested	1196	
Total Tests	1238	

42 sources were tested more than once as baseline

Source Type	Count
Wells	1180
Dug Wells	42
Artesian Wells	16
Total Tests	1238

Parameter	Units	Standard	Standard Limit	Number of Samples	Number of Detections	Minimum Detected Value	Maximum Detected Value	Mean Detected Value	Median Detected Value	Count Exceeding Standard	Percent of Samples Over Standard
Arsenic	mg/L	Primary	0.01	1220	83	0.0101	0.371	0.05	0.03	83	6.8
Barium	mg/L	Primary	2	1238	1207	0.0101	46.7	0.75	0.16	89	7.2
Benzene	µg/L	Primary	5	1238	2	0.79	1.33	1.06	1.06	0	N/A
Bicarbonate Alkalinity as CaCO3	mg/L			1238	1226	11	446	173.32	174.00	---	---
Bromide	mg/L			299	19	1.04	8.75	3.35	2.62	---	---
Cadmium	mg/L	Primary	0.005	1220	6	0.0011	0.0088	0.00	0.00	1	0.1
Calcium	mg/L			1238	1212	1.06	420	50.34	46.10	---	---
Carbonate as CaCO3	mg/L			1238	47	10.2	70.6	27.84	23.60	---	---
Chloride	mg/L	Secondary	250	1238	1004	1.06	2200	66.03	15.85	54	4.4
Chromium	mg/L	Primary	0.1	1220	11	0.005	0.0235	0.01	0.01	0	N/A
Ethane	mg/L			1238	41	0.00506	0.477	0.10	0.06	---	---
Ethyl-benzene	µg/L	Primary	700	1238	0	0	0	N/A	N/A	0	N/A
Iron	mg/L	Secondary	0.3	1238	843	0.05	350	1.81	0.27	402	32.5
Lead	mg/L	Action Level	0.015	1220	155	0.005	0.131	0.02	0.01	38	3.1
Lithium	mg/L	Action Level	0.073	277	71	0.0501	0.398	0.12	0.09	48	17.3
Magnesium	mg/L			1238	1179	1	135	11.82	10.20	---	---
Manganese	mg/L	Secondary	0.05	1238	880	0.015	10.2	0.35	0.13	663	53.6
MBAS (mol.wt 320)	mg/L	Secondary	0.5	1238	191	0.0501	63	0.44	0.08	4	0.3
Mercury	mg/L	Primary	0.002	1220	0	0	0	N/A	N/A	0	N/A
Oil & Grease HEM	mg/L			1237	6	1.5	118	38.35	23.40	---	---
pH	pH units	Secondary	6.5-8.5	1238	1238	4.3	9	7.67	7.70	---	---
Potassium	mg/L			1238	1046	1	11.3	2.08	1.73	---	---
Propane	mg/L			1238	0	0	0	N/A	N/A	---	---
Selenium	mg/L	Primary	0.05	1220	2	0.0466	0.169	0.11	0.11	1	0.1
Silver	mg/L	Secondary	0.1	1220	0	0	0	N/A	N/A	0	N/A
Sodium	mg/L			1238	1208	1	1120	52.22	27.40	---	---
Specific conductance	umho/cm			1238	1238	23.2	12300	584.85	457.00	---	---
Strontium	mg/L			676	627	0.0501	64.4	1.55	0.76	---	---
Sulfate	mg/L	Secondary	250	1238	1095	1	1070	30.13	18.50	14	1.1
Sulfur	mg/L			1220	1091	0.52	362	10.17	6.09	---	---
Temp of pH determ.	Deg C			1238	1238	21	25	21.91	21.70	---	---
Toluene	µg/L	Primary	1000	1238	14	0.5	8.75	1.53	0.93	0	N/A
TDS	mg/L	Secondary	500	1238	1236	14	4600	317.08	248.00	141	11.4
TSS	mg/L			1238	559	1	2360	14.19	2.20	---	---
Turbidity	NTU	CHK Arbitrary	5	1238	766	1	553	11.48	3.10	283	---
Xylenes, total	µg/L	Primary	10000	1238	1	1.13	1.13	1.13	1.13	0	N/A

Parameter	Units	Standard	Standard Limit	Number of Samples	Methane Detections	Percent Methane Detections	Maximum Detected Value	Mean Detected Value	Median Detected Value	Number over 3 mg/L	Number Over 7 mg/L	Number over 20 mg/L
Methane	mg/L	CHK	3, 7, 20	1238	504	40.7	72.1	4.12	0.703	149	95	30

Regional Baseline Summary, Groundwater (EASTERN)

5 Mile Radius of Brotzman's Cistern

Sample Date Range	6/24/2009	1/4/2012
Property Owners	502	
Unique sources tested	570	

Source Type	Count
Wells	552
Dug Wells	15
Artesian Wells	3
Total Tests	570

Parameter	Units	Standard	Standard Li	Number of Samples	Number of Detections	Minimum Detected Value	Maximum Detected Value	Mean Detected Value	Median Detected Value	Count Exceeding Standard	Percent of Samples Over Standard
Arsenic	mg/L	Primary	0.01	542	10	0.0103	0.199	0.04	0.02	10	1.8
Barium	mg/L	Primary	2	562	557	0.0217	6.46	0.40	0.18	15	2.7
Benzene	µg/L	Primary	5	562	1	0.61	0.61	0.61	0.61	0	N/A
Bicarbonate Alkalinity as CaCO3	mg/L			562	560	11.3	303	134.52	140.00	---	---
Bromide	mg/L			39	1	11.1	11.1	11.10	11.10	---	---
Cadmium	mg/L	Primary	0.005	542	2	0.0012	0.0013	0.00	0.00	0	N/A
Calcium	mg/L			562	555	1.07	82.7	31.23	29.70	---	---
Carbonate as CaCO3	mg/L			562	23	10.1	81.4	28.37	19.00	---	---
Chloride	mg/L	Secondary	250	562	392	1.11	848	22.46	8.58	4	0.7
Chromium	mg/L	Primary	0.1	542	6	0.0056	0.0748	0.03	0.02	0	N/A
Ethane	mg/L			570	7	0.0281	0.123	0.08	0.09	---	---
Ethyl-benzene	µg/L	Primary	700	562	0	0	0	N/A	N/A	0	N/A
Iron	mg/L	Secondary	0.3	562	262	0.0512	91.4	1.07	0.16	88	15.7
Lead	mg/L	Action Level	0.015	542	60	0.0051	0.589	0.03	0.01	18	3.3
Lithium	mg/L	Action Level	0.073	37	7	0.0613	0.381	0.17	0.13	5	13.5
Magnesium	mg/L			562	548	1.01	27.4	8.98	8.22	---	---
Manganese	mg/L	Secondary	0.05	562	262	0.0152	124	0.66	0.06	143	25.4
MBAS (mol.wt 320)	mg/L	Secondary	0.5	562	94	0.0501	5.42	0.15	0.07	1	0.2
Mercury	mg/L	Primary	0.002	542	1	0.00027	0.00027	0.00	0.00	0	N/A
Oil & Grease HEM	mg/L			561	2	109	110	109.50	109.50	---	---
pH	pH units	Secondary	6.5-8.5	562	562	5.6	9.4	7.64	7.70	---	---
Potassium	mg/L			562	487	1	86.8	1.86	1.53	---	---
Propane	mg/L			570	0	0	0	N/A	N/A	---	---
Selenium	mg/L	Primary	0.05	542	0	0	0	N/A	N/A	0	N/A
Silver	mg/L	Secondary	0.1	542	0	0	0	N/A	N/A	0	N/A
Sodium	mg/L			562	560	1.19	732	27.17	15.90	---	---
Specific conductance	umho/cm			562	562	31.2	3440	347.49	324.00	---	---
Strontium	mg/L			104	100	0.0573	3.21	0.76	0.58	---	---
Sulfate	mg/L	Secondary	250	562	513	1.22	77.9	16.11	14.70	0	N/A
Sulfur	mg/L			528	480	0.55	24.8	5.17	4.40	---	---
Temp of pH determ.	Deg C			562	562	21	25	21.96	21.85	---	---
Toluene	µg/L	Primary	1000	562	1	1.64	1.64	1.64	1.64	0	N/A
TDS	mg/L	Secondary	500	562	562	12	1760	187.22	176.00	6	1.1
TSS	mg/L			562	172	0.4	339	13.09	2.30	---	---
Turbidity	NTU	CHK Arbitrary	5	562	214	1	204	8.85	2.20	55	---
Xylenes, total	µg/L	Primary	10000	562	1	0.81	0.81	0.81	0.81	0	N/A

Parameter	Units	Standard	Standard Limit	Number of Samples	Methane Detections	Methane Percent Detections	Maximum Detected Value	Mean Detected Value	Median Detected Value	Number over 3 mg/L	Number Over 7 mg/L	Number over 20 mg/L
Methane	mg/L	CHK	3, 7, 20	570	157	27.5	40.7	4.14	0.518	15	19	11

Regional Baseline Summary, Groundwater (CENTRAL)

3 Mile Buffer around Terry Twp EPA Split Sampling Residents

Sample Date Range 9/17/2009 1/10/2012

Property Owners 1686

Unique sources tested 1933

32 sources were tested more than once as baseline

Source Type	Count
Wells	1886
Dug Wells	58
Artesian Wells	21
Total Tests	1965

Parameter	Units	Standard	Standard Limit	Number of Samples	Number of Detections	Minimum Detected Value	Maximum Detected Value	Mean Detected Value	Median Detected Value	Count Exceeding Standard	Percent of Samples Over Standard
Arsenic	mg/L	Primary	0.01	1953	71	0.01	0.166	0.04	0.02	70	3.6
Barium	mg/L	Primary	2	1961	1926	0.0104	32.5	0.47	0.17	100	5.1
Benzene	µg/L	Primary	5	1960	0	0	0	N/A	N/A	0	N/A
Bicarbonate Alkalinity as CaCO3	mg/L			1961	1956	11.5	367	148.41	151.00	---	---
Bromide	mg/L			304	5	1.96	8.54	6.63	7.55	---	---
Cadmium	mg/L	Primary	0.005	1953	8	0.0012	0.0266	0.01	0.00	1	0.1
Calcium	mg/L			1961	1923	1.09	229	39.88	40.20	---	---
Carbonate as CaCO3	mg/L			1960	73	10	77.9	27.01	24.40	---	---
Chloride	mg/L	Secondary	250	1960	1440	1.04	1980	33.46	9.07	32	1.6
Chromium	mg/L	Primary	0.1	1953	10	0.0054	0.0228	0.01	0.01	0	N/A
Ethane	mg/L			1965	25	0.00525	0.484	0.10	0.07	---	---
Ethyl-benzene	µg/L	Primary	700	1960	1	0.6	0.6	0.60	0.60	0	N/A
Iron	mg/L	Secondary	0.3	1961	1103	0.05	65	0.93	0.21	419	21.4
Lead	mg/L	Action Level	0.015	1953	179	0.005	0.46	0.03	0.01	66	3.4
Lithium	mg/L	Action Level	0.073	254	40	0.0505	0.99	0.12	0.09	25	9.8
Magnesium	mg/L			1961	1873	1	41.4	8.50	7.49	---	---
Manganese	mg/L	Secondary	0.05	1961	936	0.015	4.01	0.23	0.10	644	32.8
MBAS (mol.wt 320)	mg/L	Secondary	0.5	1960	269	0.0503	0.608	0.12	0.09	4	0.2
Mercury	mg/L	Primary	0.002	1953	1	0.000224	0.000224	0.00	0.00	0	N/A
Oil & Grease HEM	mg/L			1961	5	1.4	452	191.46	97.90	---	---
pH	pH units	Secondary	6.5-8.5	1961	1961	5.4	9.3	7.63	7.70	---	---
Potassium	mg/L			1961	1446	1	21	1.77	1.50	---	---
Propane	mg/L			1965	3	0.0204	0.038	0.03	0.03	---	---
Selenium	mg/L	Primary	0.05	1953	2	0.0218	0.169	0.10	0.10	1	0.1
Silver	mg/L	Secondary	0.1	1953	0	0	0	N/A	N/A	0	N/A
Sodium	mg/L			1961	1958	1	1610	33.14	14.00	---	---
Specific conductance	umho/cm			1961	1961	49.7	9200	409.02	355.00	---	---
Strontium	mg/L			775	722	0.05	13.4	0.78	0.46	---	---
Sulfate	mg/L	Secondary	250	1961	1825	1.05	350	17.65	14.90	2	0.1
Sulfur	mg/L			1935	1821	0.5	120	5.78	4.66	---	---
Temp of pH determ.	Deg C			1961	1961	21	211	21.96	21.70	---	---
Toluene	µg/L	Primary	1000	1960	11	0.56	18.8	4.89	1.30	0	N/A
TDS	mg/L	Secondary	500	1961	1961	17	5410	222.73	195.00	54	2.8
TSS	mg/L			1961	662	1	1370	13.17	2.40	---	---
Turbidity	NTU	CHK Arbitrary	5	1961	963	1	977	9.64	2.60	280	---
Xylenes, total	µg/L	Primary	10000	1960	3	0.61	2.95	1.67	1.44	0	N/A

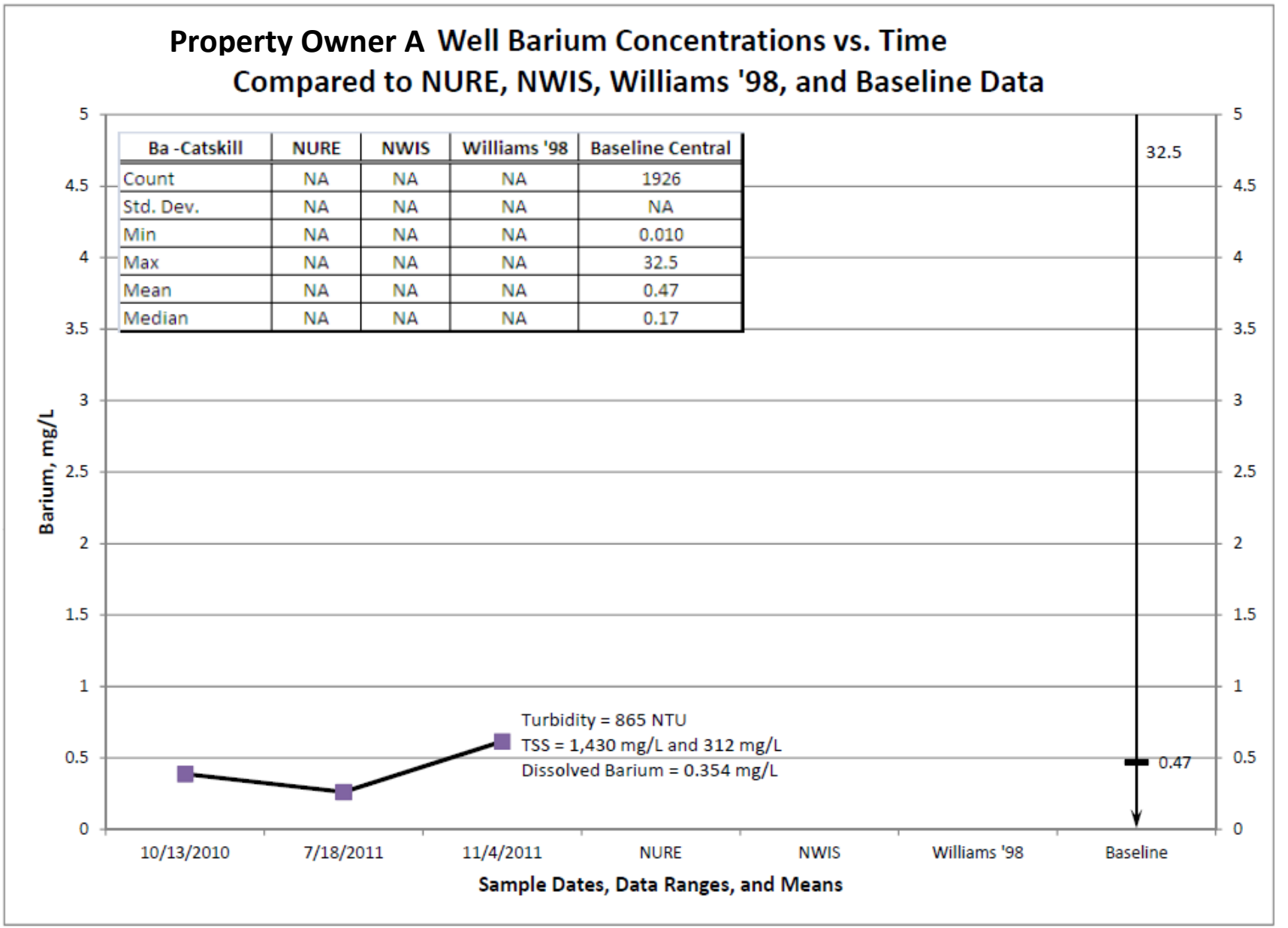
Parameter	Units	Standard	Standard Limit	Number of Samples	Methane Detections	Percent Methane Detections	Maximum Detected Value	Mean Detected Value	Median Detected Value	Number over 3 mg/L	Number Over 7 mg/L	Number over 20 mg/L
Methane	mg/L	CHK	3, 7, 20	1965	526	26.8	43.3	3.27	0.3585	135	73	25

Parameter	Standard	Central		Eastern		Western	
		Count Exceeeding Standard	Percent of Detections	Count Exceeeding Standard	Percent of Detections	Count Exceeeding Standard	Percent of Detections
Lead	0.005	174	8.9	60	11.1	152	12.5
Lithium	0.031	40	15.7	7	18.9	71	25.6

Groundwater only
Bradford county

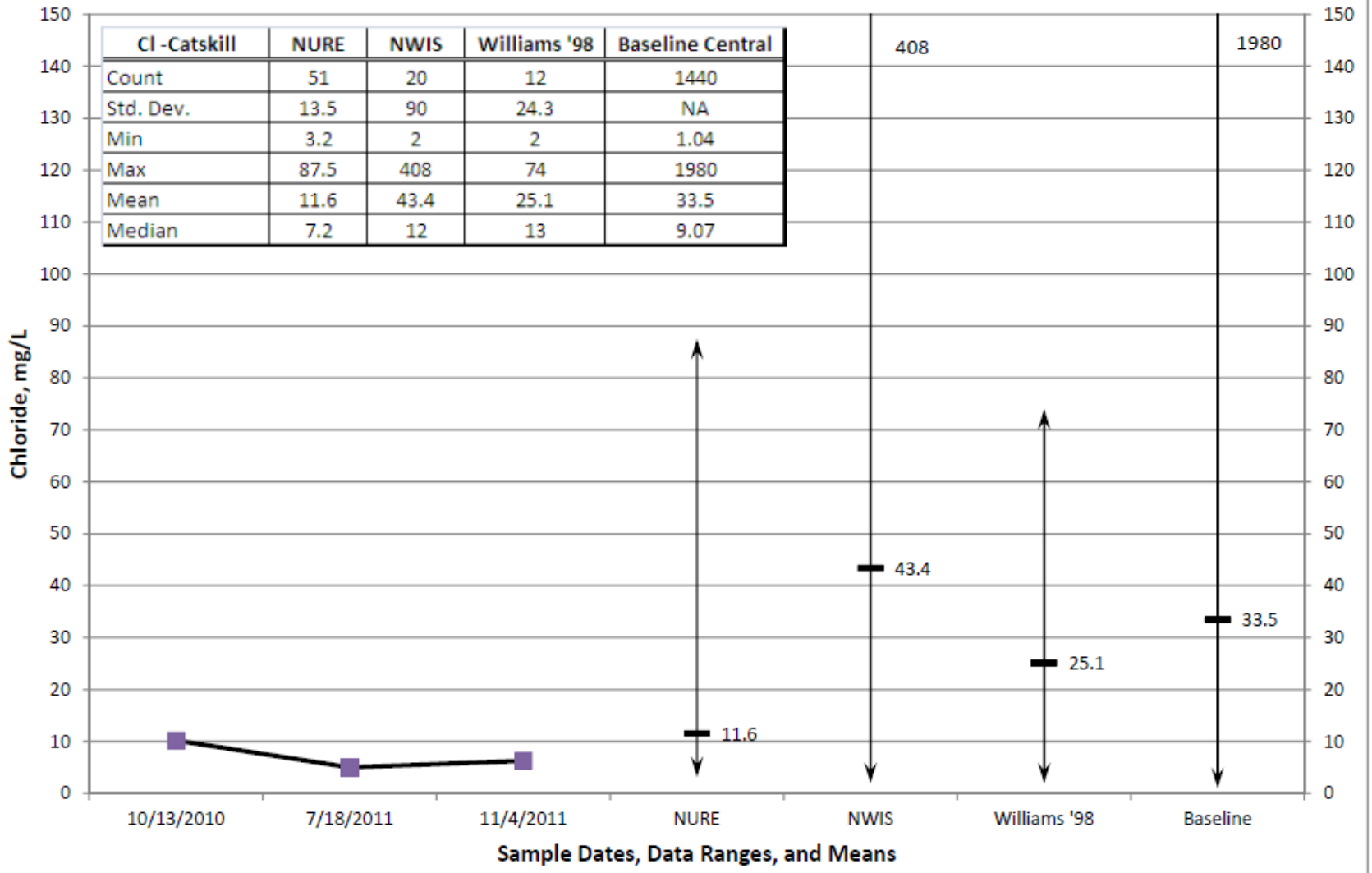
APPENDIX D
TIME PLOTS

APPENDIX D-1
TIME PLOTS
PROPERTY OWNER A


Property Owner A Well Barium Concentrations vs. Time
Compared to NURE, NWIS, Williams '98, and Baseline Data
Ba -Catskill | NURE | NWIS | Williams '98 | Baseline Central
Count | NA | NA | NA | 1926
Std. Dev. | NA | NA | NA | NA
Min | NA | NA | NA | 0.010
Max | NA | NA | NA | 32.5
Mean | NA | NA | NA | 0.47
Median | NA | NA | NA | 0.17
32.5
0.47
Turbidity = 865 NTU
TSS = 1,430 mg/L and 312 mg/L
Dissolved Barium = 0.354 mg/L
Barium, mg/L
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
10/13/2010
7/18/2011
11/4/2011
NURE
NWIS
Williams '98
Baseline
Sample Dates, Data Ranges, and Means

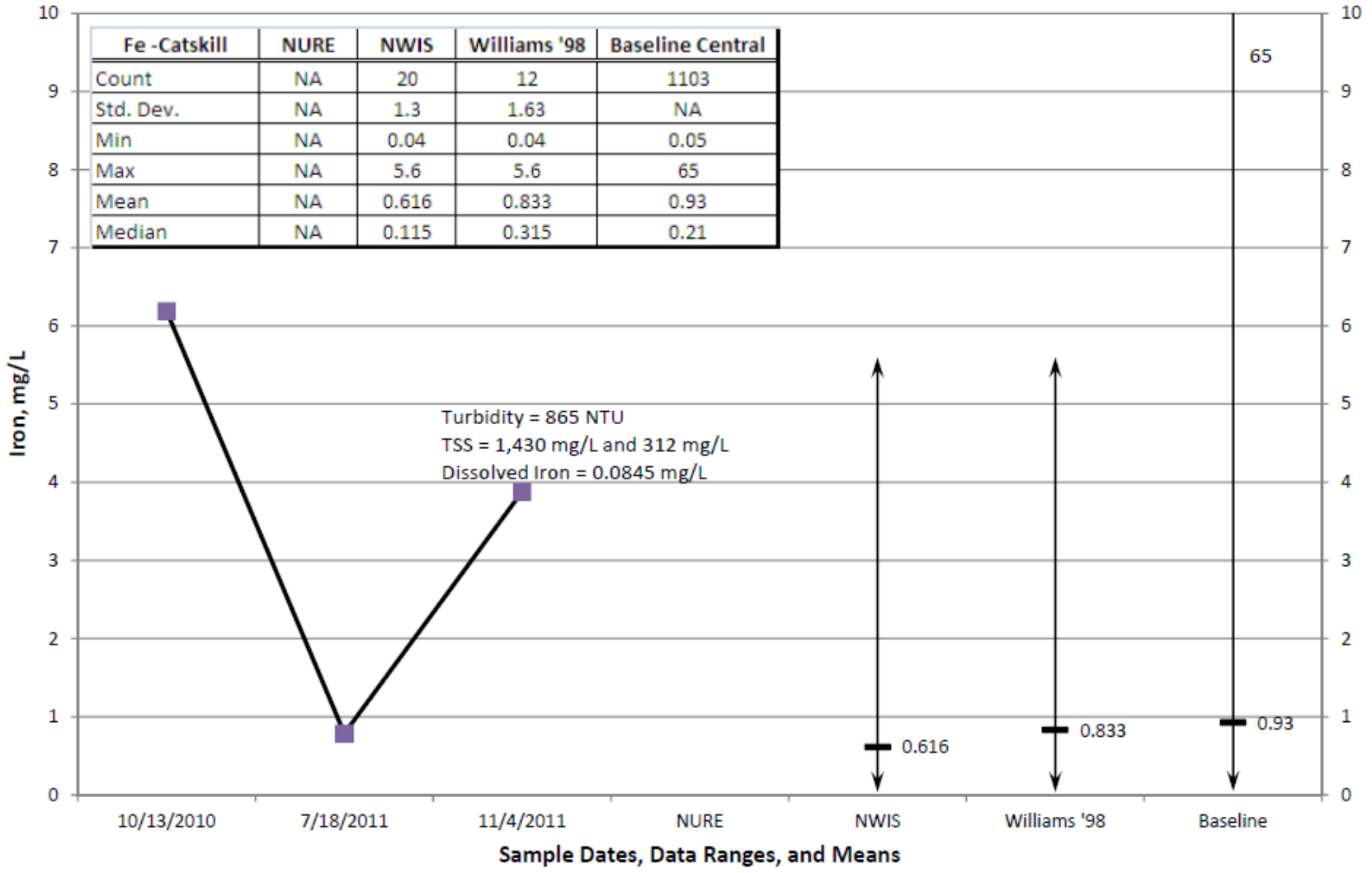
Property Owner A Well Chloride Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Cl -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	51	20	12	1440
Std. Dev.	13.5	90	24.3	NA
Min	3.2	2	2	1.04
Max	87.5	408	74	1980
Mean	11.6	43.4	25.1	33.5
Median	7.2	12	13	9.07



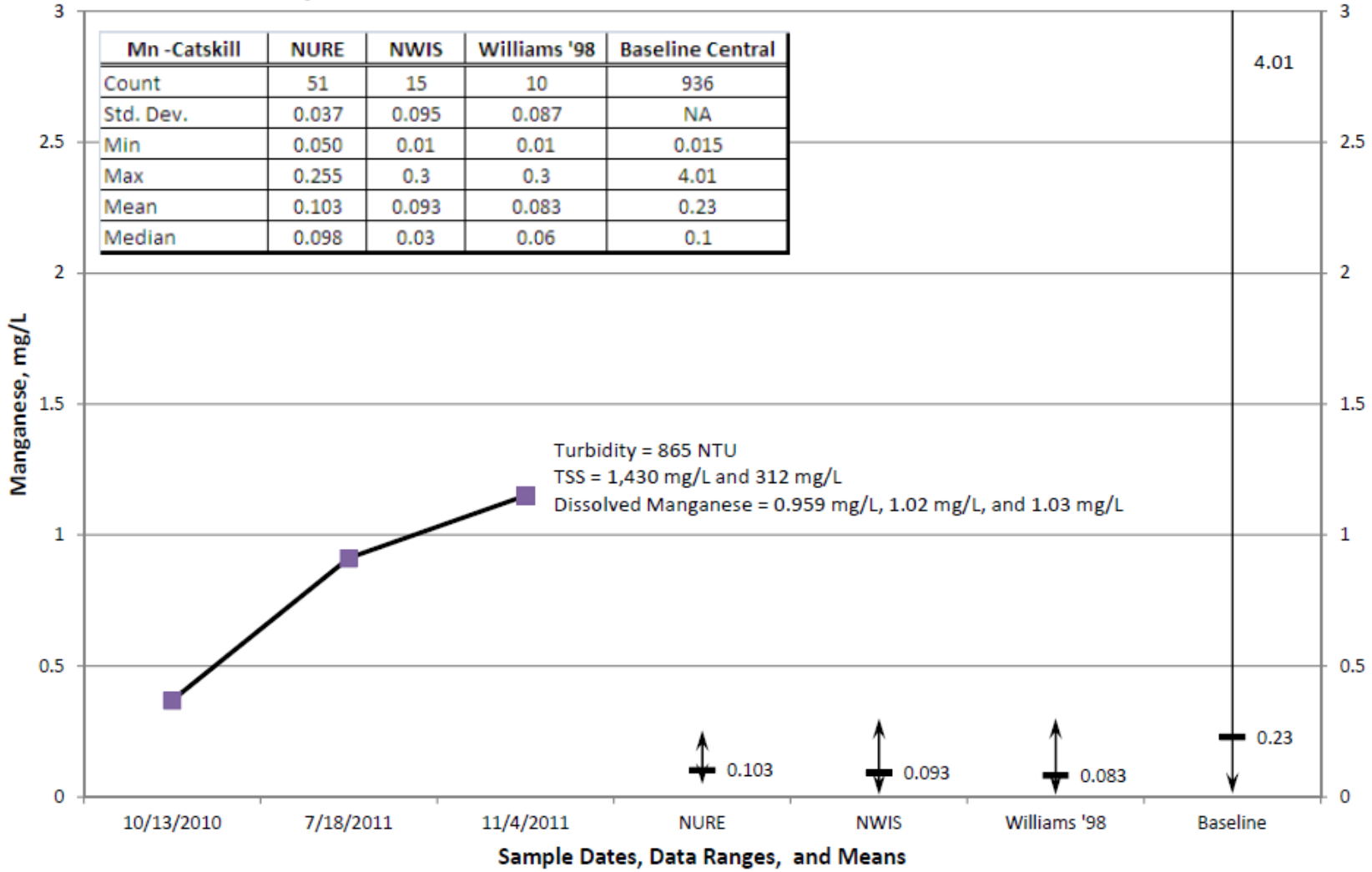
Property Owner A Well Iron Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Fe -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	NA	20	12	1103
Std. Dev.	NA	1.3	1.63	NA
Min	NA	0.04	0.04	0.05
Max	NA	5.6	5.6	65
Mean	NA	0.616	0.833	0.93
Median	NA	0.115	0.315	0.21



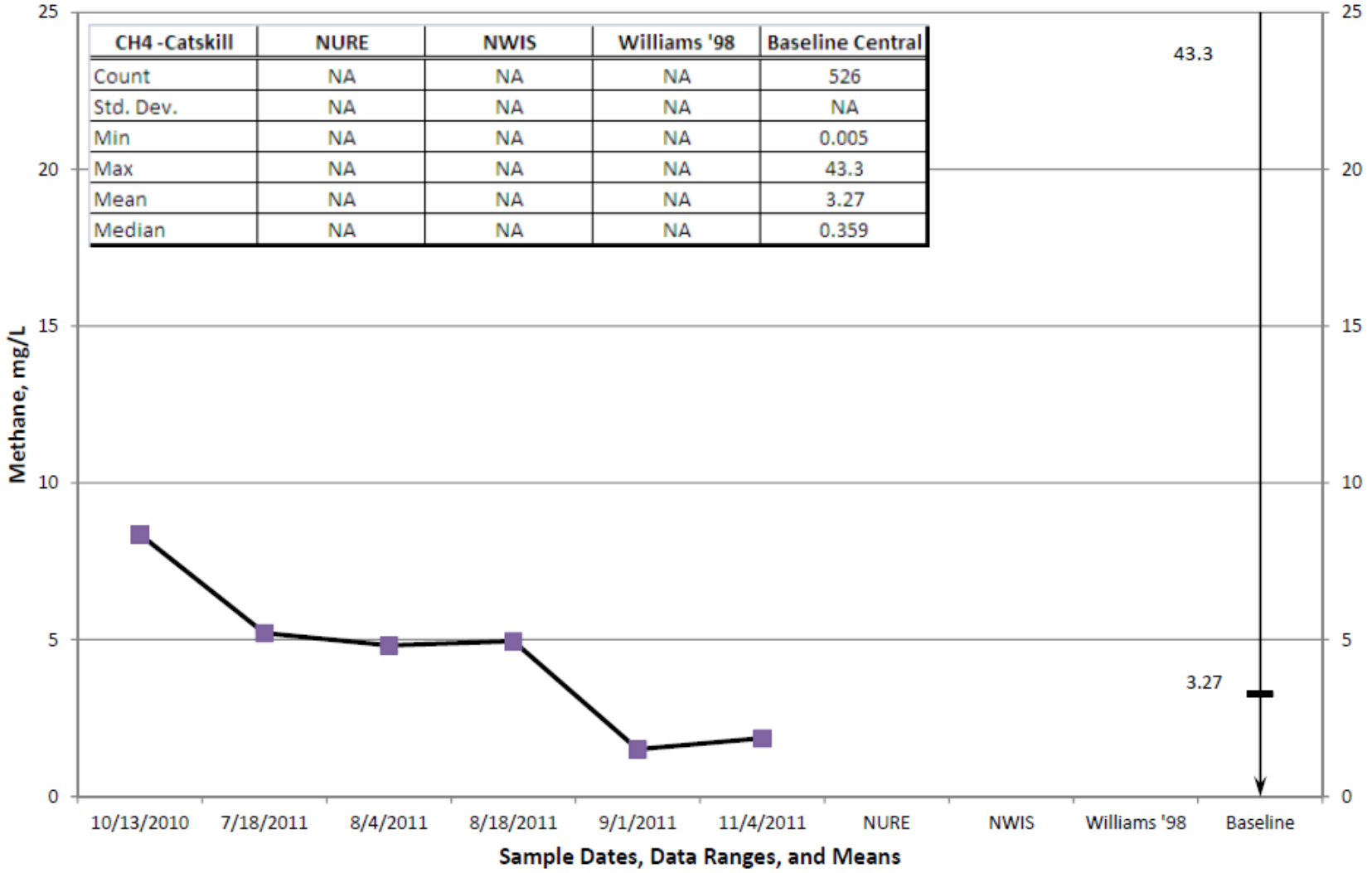
Property Owner A Well Manganese Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

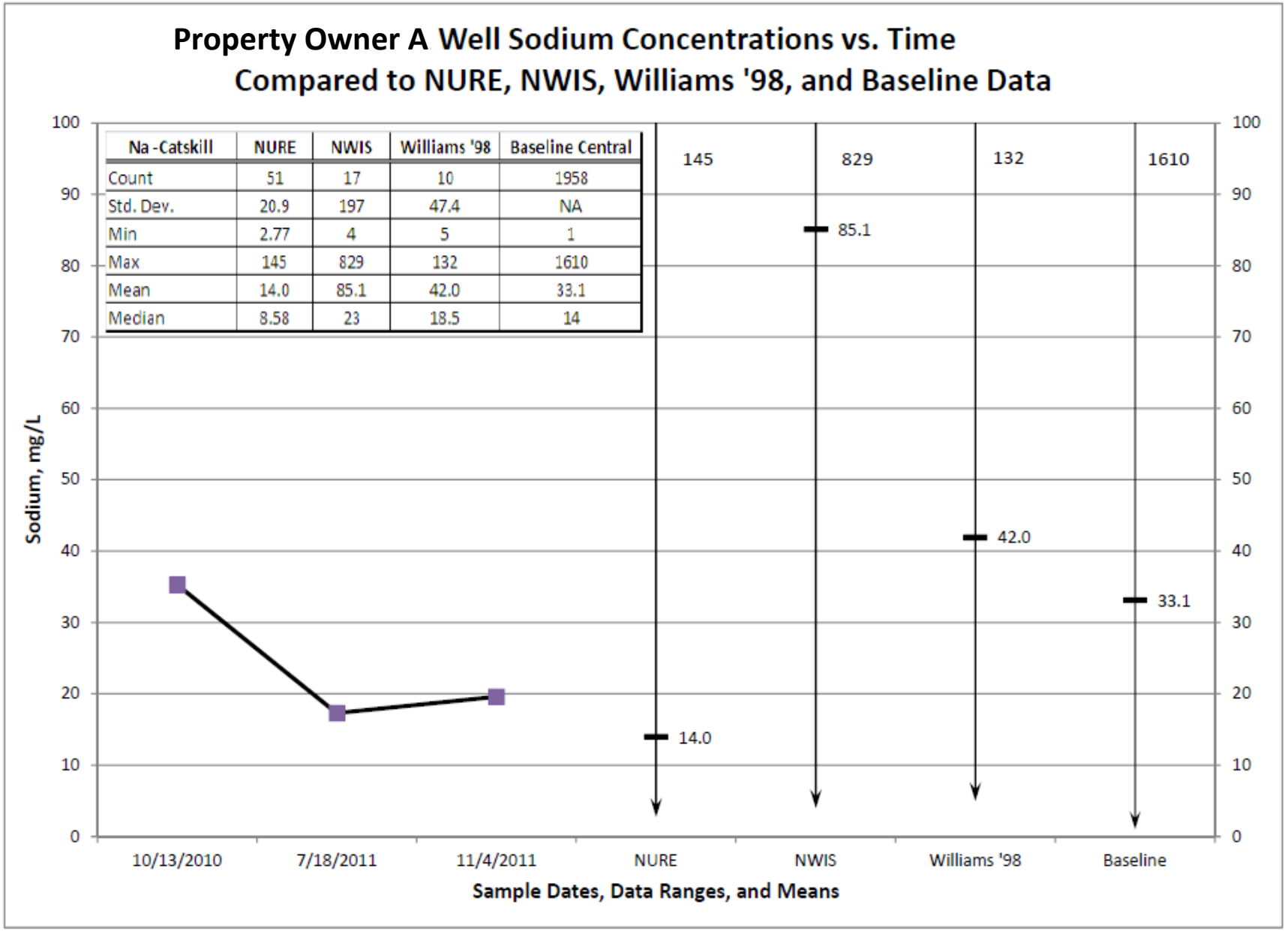
Mn -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	51	15	10	936
Std. Dev.	0.037	0.095	0.087	NA
Min	0.050	0.01	0.01	0.015
Max	0.255	0.3	0.3	4.01
Mean	0.103	0.093	0.083	0.23
Median	0.098	0.03	0.06	0.1

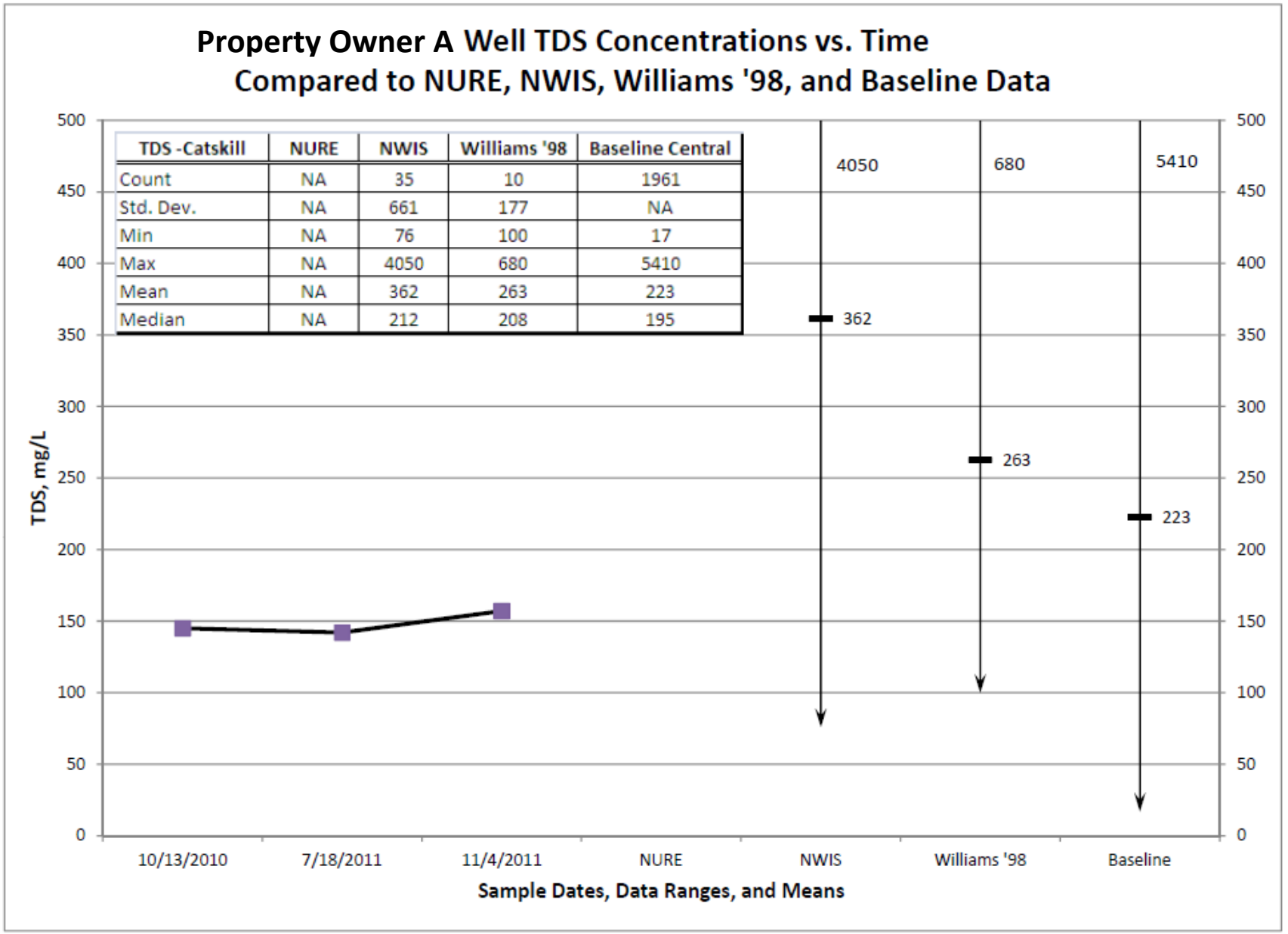


Property Owner A Well Methane Concentrations vs. Time
Compared to NURE, NWIS Data, Williams '98, and Baseline Data

CH4 -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	NA	NA	NA	526
Std. Dev.	NA	NA	NA	NA
Min	NA	NA	NA	0.005
Max	NA	NA	NA	43.3
Mean	NA	NA	NA	3.27
Median	NA	NA	NA	0.359



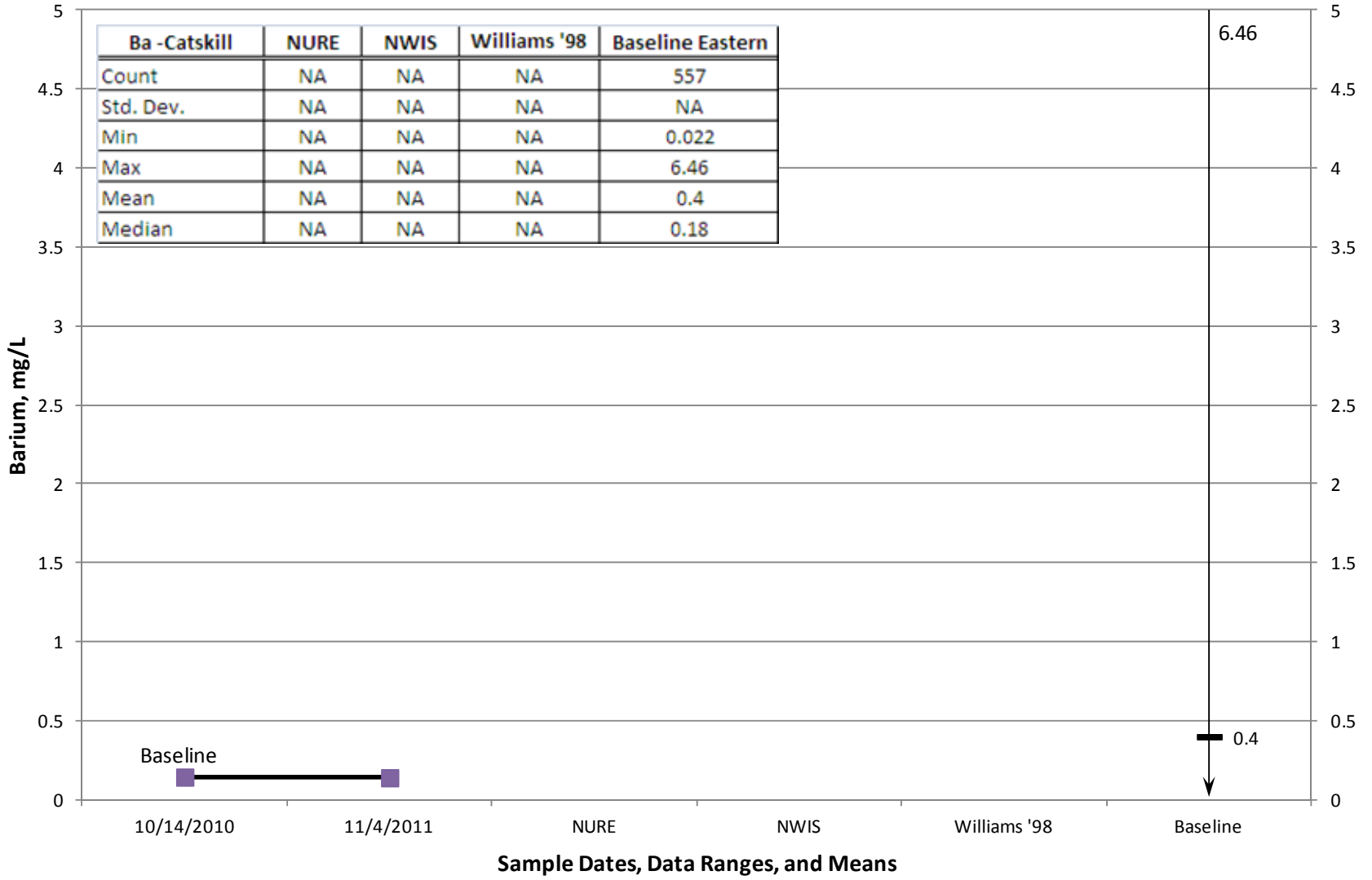

Property Owner A Well Sodium Concentrations vs. Time
Compared to NURE, NWIS, Williams '98, and Baseline Data
Na -Catskill | NURE | NWIS | Williams '98 | Baseline Central
Count | 51 | 17 | 10 | 1958
Std. Dev. | 20.9 | 197 | 47.4 | NA
Min | 2.77 | 4 | 5 | 1
Max | 145 | 829 | 132 | 1610
Mean | 14.0 | 85.1 | 42.0 | 33.1
Median | 8.58 | 23 | 18.5 | 14
145
829
132
1610
85.1
42.0
33.1
14.0
Sodium, mg/L
0
10
20
30
40
50
60
70
80
90
100
10/13/2010
7/18/2011
11/4/2011
NURE
NWIS
Williams '98
Baseline
Sample Dates, Data Ranges, and Means


Property Owner A Well TDS Concentrations vs. Time
Compared to NURE, NWIS, Williams '98, and Baseline Data
TDS -Catskill | NURE | NWIS | Williams '98 | Baseline Central
Count | NA | 35 | 10 | 1961
Std. Dev. | NA | 661 | 177 | NA
Min | NA | 76 | 100 | 17
Max | NA | 4050 | 680 | 5410
Mean | NA | 362 | 263 | 223
Median | NA | 212 | 208 | 195
4050
680
5410
362
263
223
TDS, mg/L
500
450
400
350
300
250
200
150
100
50
0
10/13/2010
7/18/2011
11/4/2011
NURE
NWIS
Williams '98
Baseline
Sample Dates, Data Ranges, and Means

APPENDIX D-2
TIME PLOTS
PROPERTY OWNER B

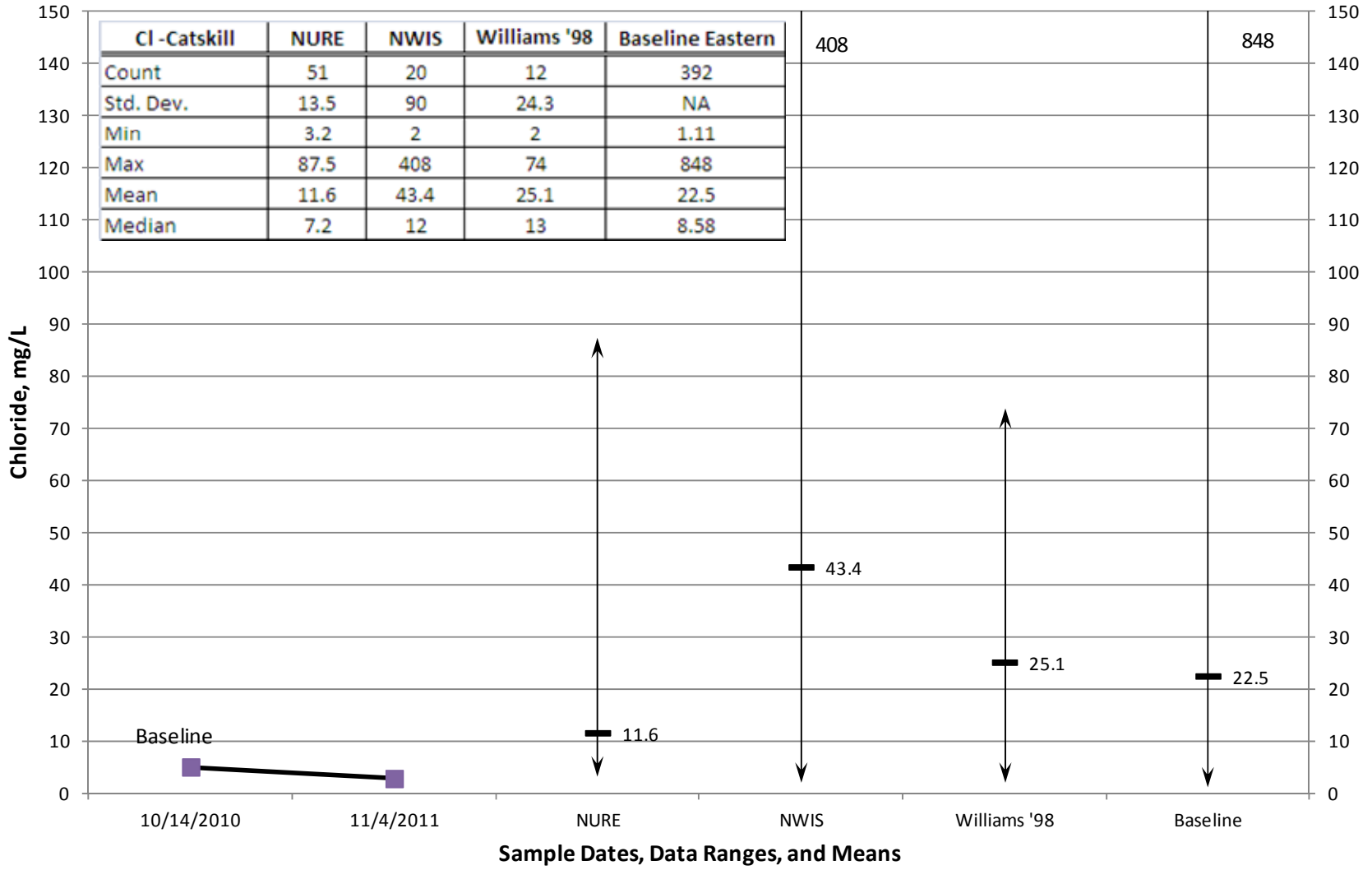
Property Owner B Spring Barium Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Ba -Catskill	NURE	NWIS	Williams '98	Baseline Eastern
Count	NA	NA	NA	557
Std. Dev.	NA	NA	NA	NA
Min	NA	NA	NA	0.022
Max	NA	NA	NA	6.46
Mean	NA	NA	NA	0.4
Median	NA	NA	NA	0.18



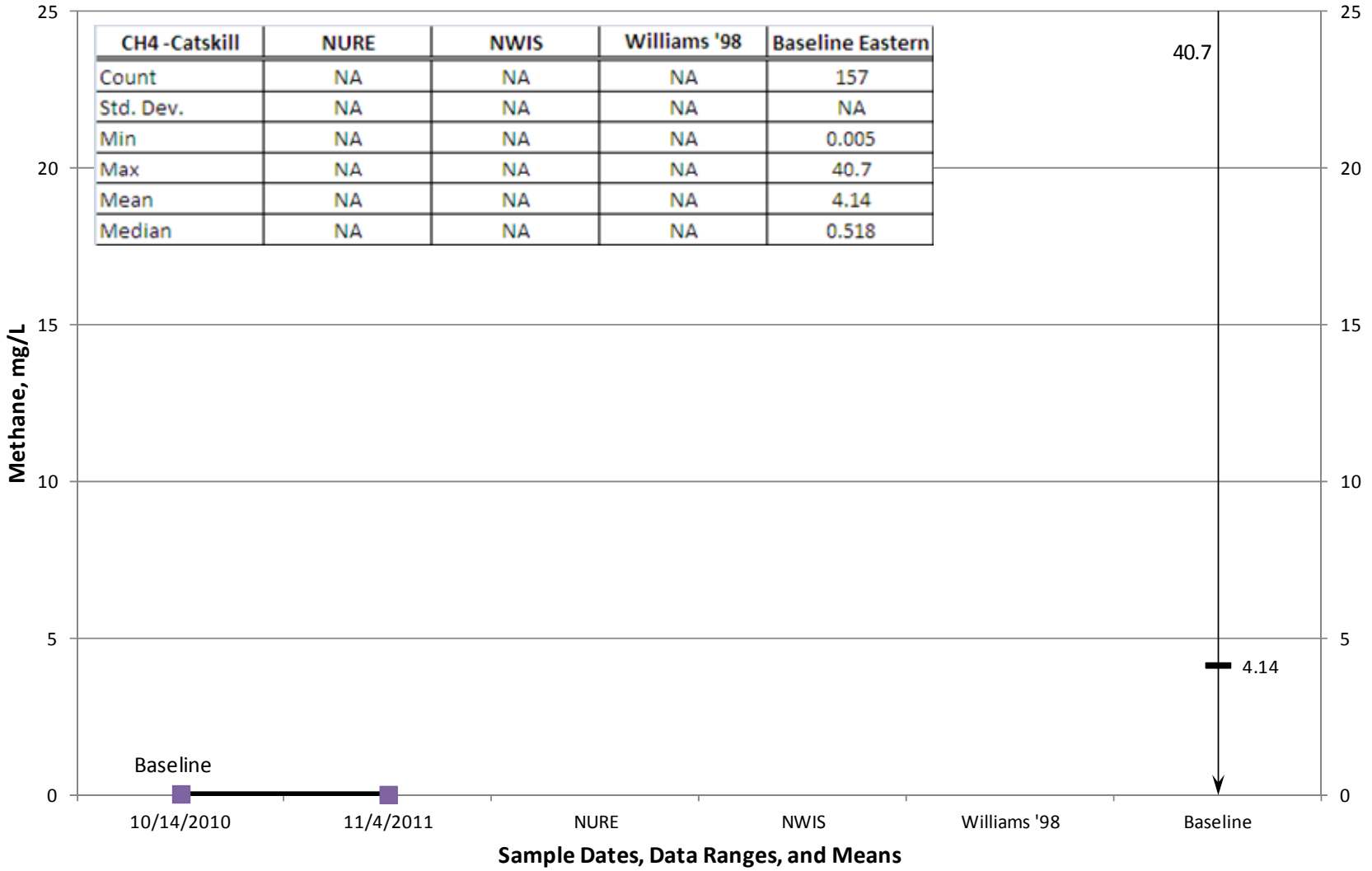
Property Owner B Spring Chloride Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Cl -Catskill	NURE	NWIS	Williams '98	Baseline Eastern
Count	51	20	12	392
Std. Dev.	13.5	90	24.3	NA
Min	3.2	2	2	1.11
Max	87.5	408	74	848
Mean	11.6	43.4	25.1	22.5
Median	7.2	12	13	8.58



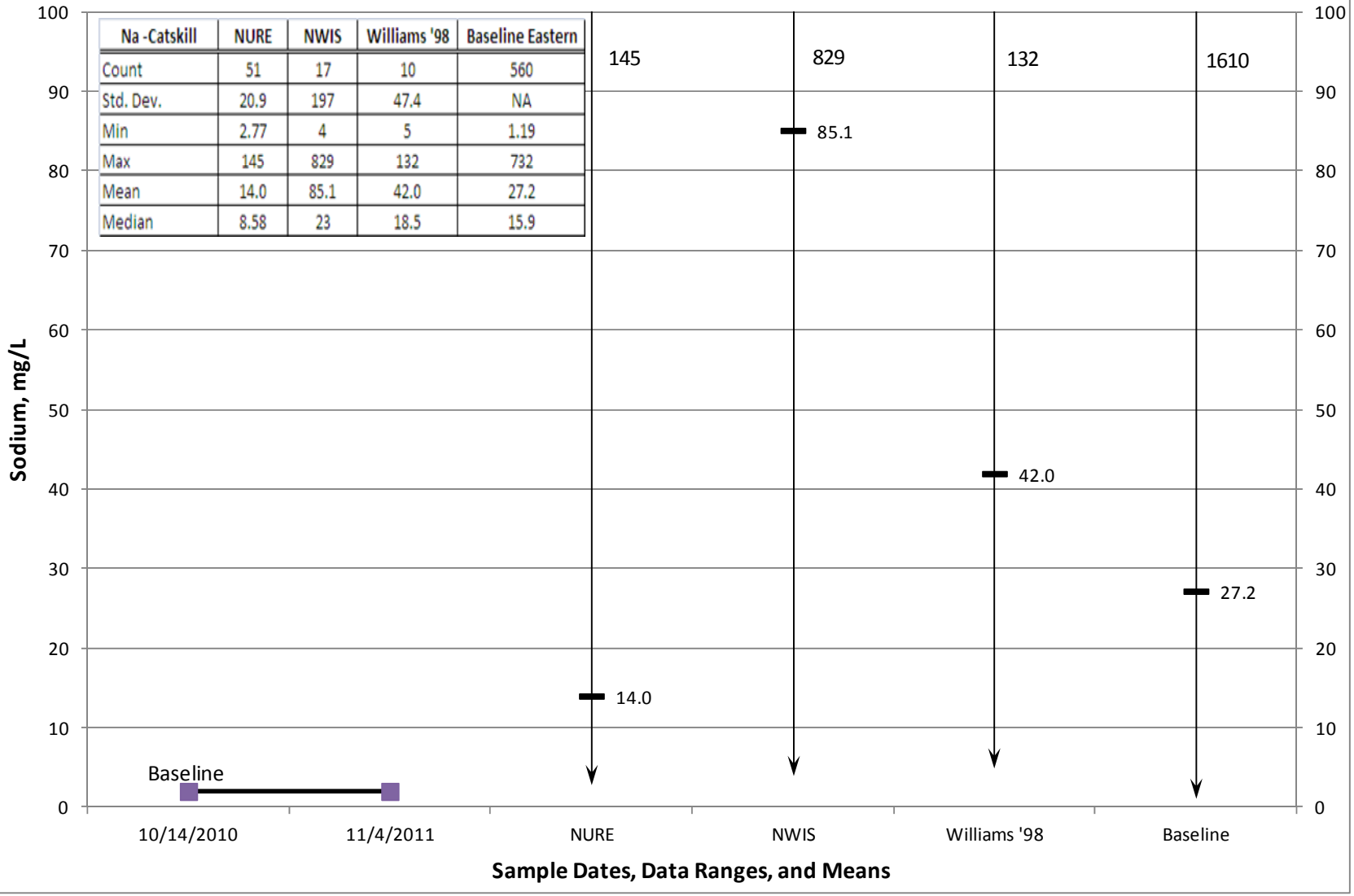
Property Owner B Spring Methane Concentrations vs. Time Compared to NURE, NWIS Data, Williams '98, and Baseline Data

CH4 -Catskill	NURE	NWIS	Williams '98	Baseline Eastern
Count	NA	NA	NA	157
Std. Dev.	NA	NA	NA	NA
Min	NA	NA	NA	0.005
Max	NA	NA	NA	40.7
Mean	NA	NA	NA	4.14
Median	NA	NA	NA	0.518



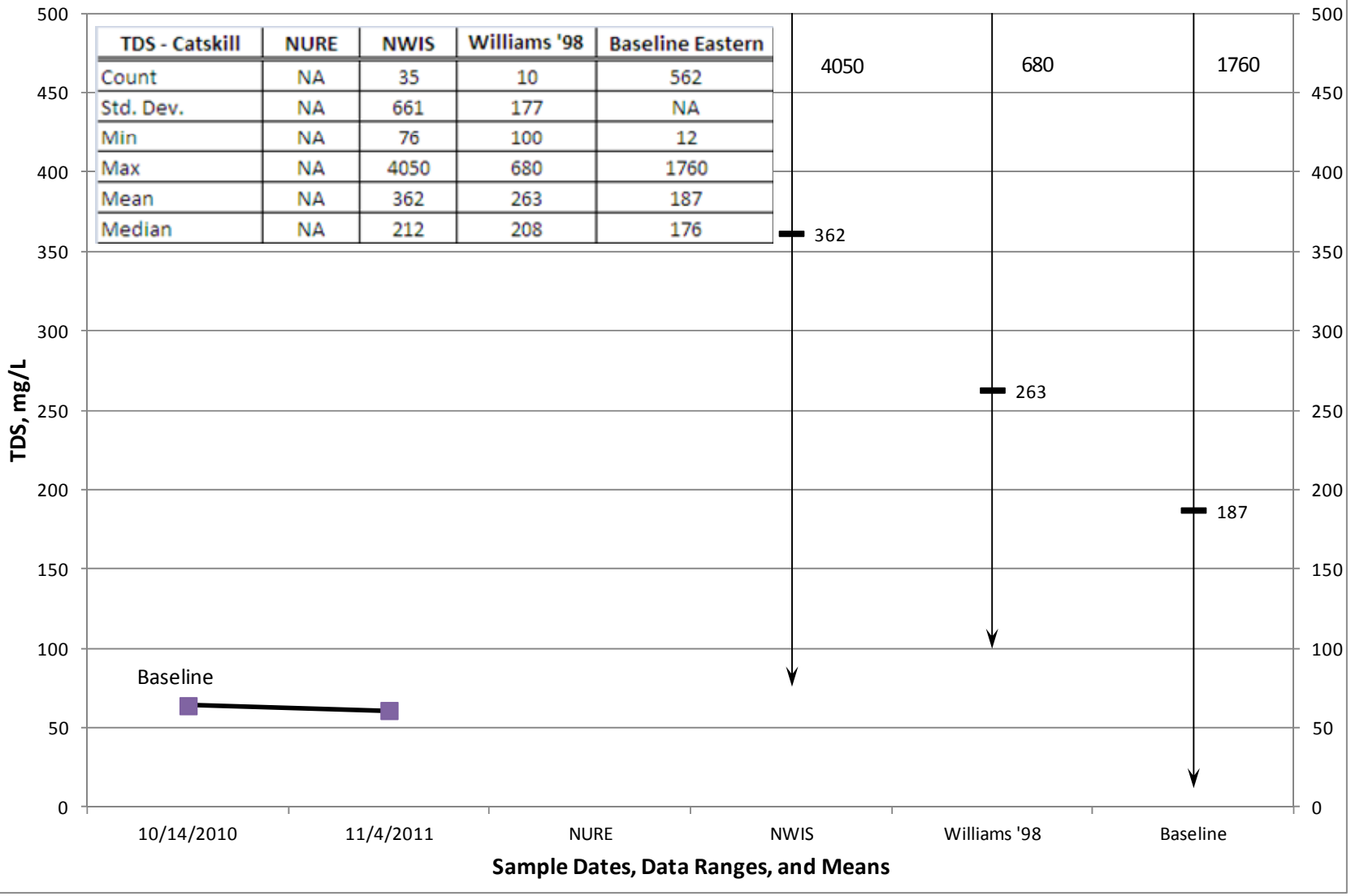
Property Owner B Spring Sodium Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Na -Catskill	NURE	NWIS	Williams '98	Baseline Eastern
Count	51	17	10	560
Std. Dev.	20.9	197	47.4	NA
Min	2.77	4	5	1.19
Max	145	829	132	732
Mean	14.0	85.1	42.0	27.2
Median	8.58	23	18.5	15.9

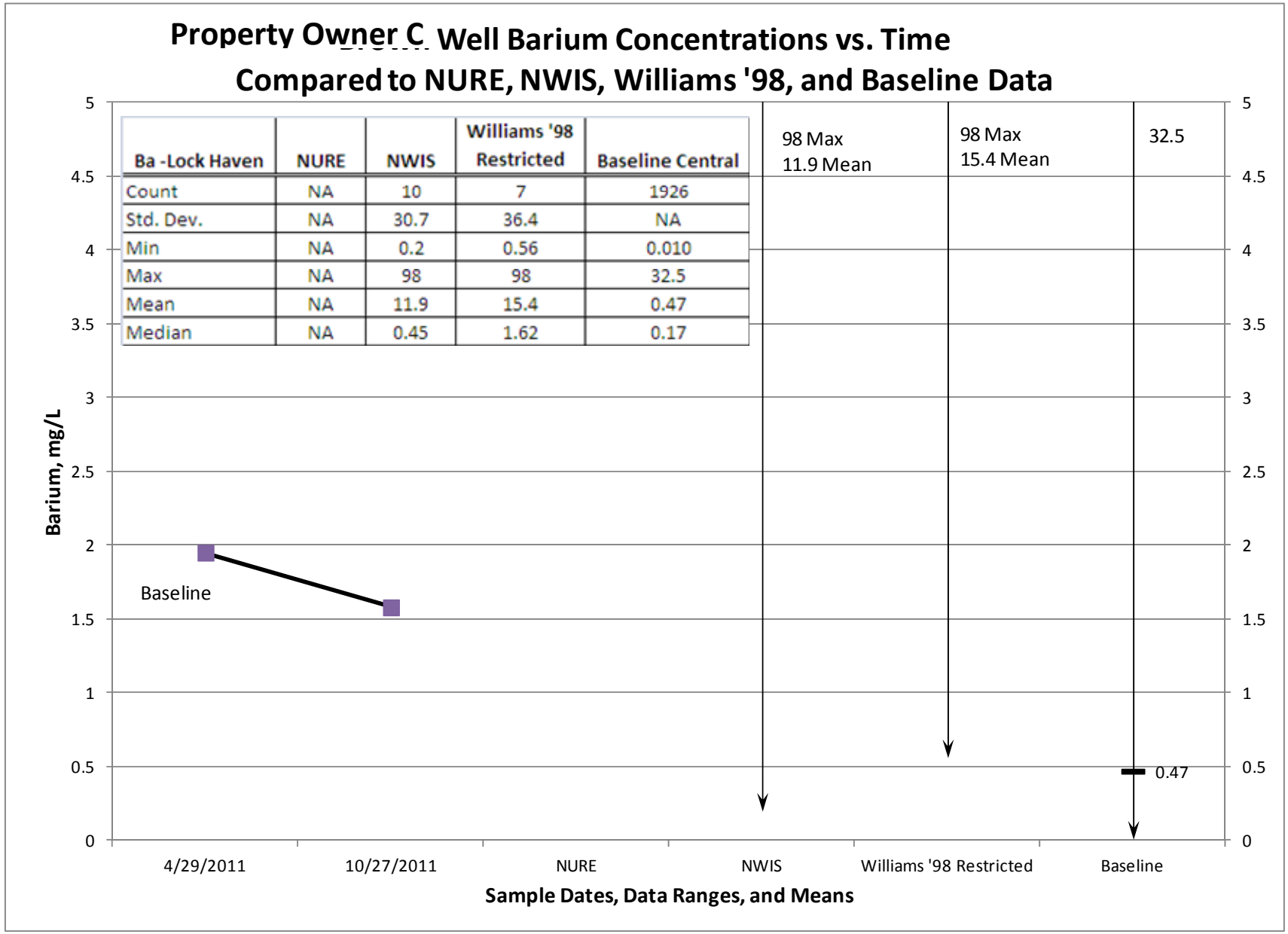


Property Owner B Spring TDS Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

TDS - Catskill	NURE	NWIS	Williams '98	Baseline Eastern
Count	NA	35	10	562
Std. Dev.	NA	661	177	NA
Min	NA	76	100	12
Max	NA	4050	680	1760
Mean	NA	362	263	187
Median	NA	212	208	176

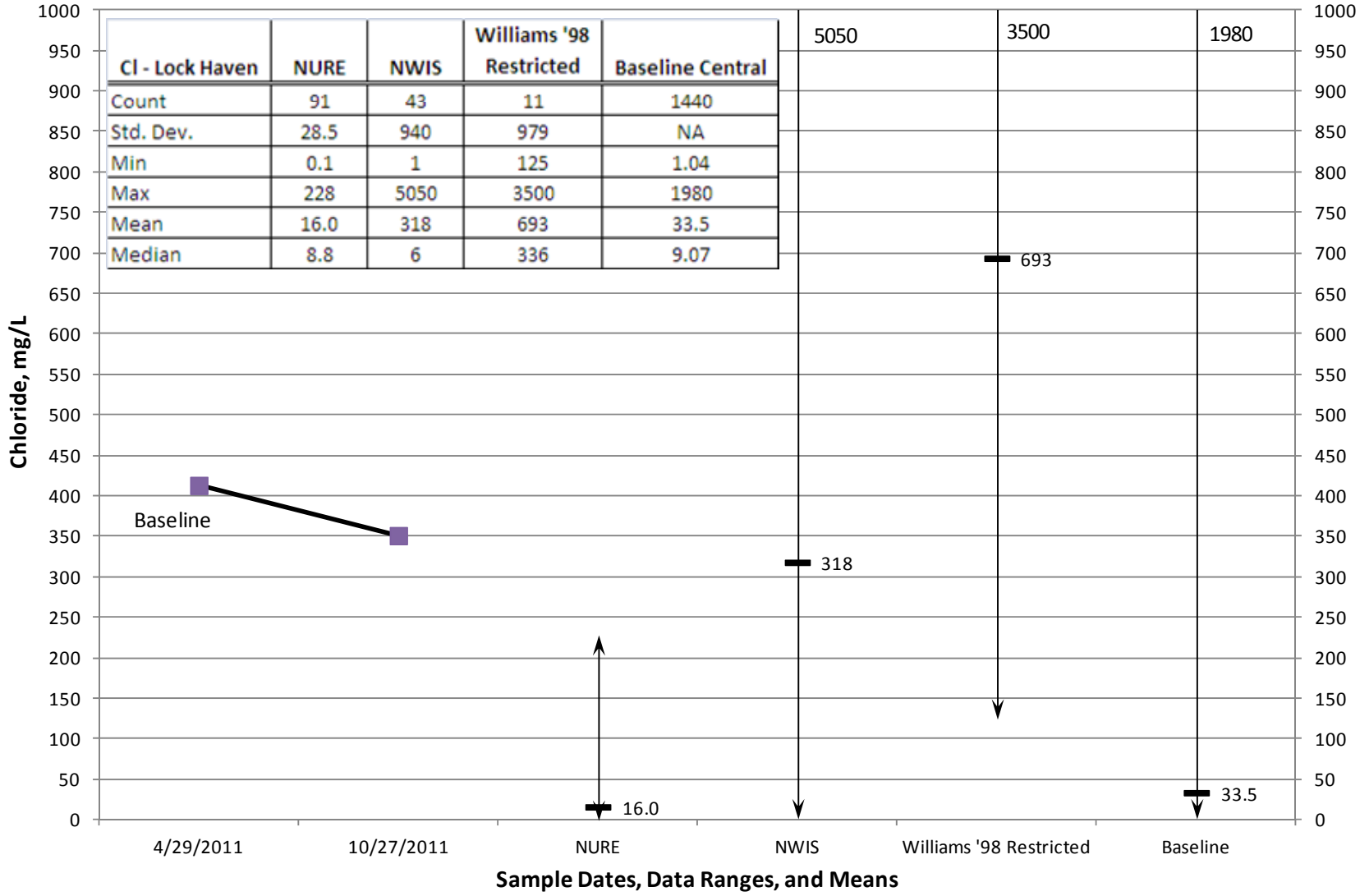


APPENDIX D-3
TIME PLOTS
PROPERTY OWNER C


Property Owner C Well Barium Concentrations vs. Time
Compared to NURE, NWIS, Williams '98, and Baseline Data
Ba -Lock Haven | NURE | NWIS | Williams '98 Restricted | Baseline Central
Count | NA | 10 | 7 | 1926
Std. Dev. | NA | 30.7 | 36.4 | NA
Min | NA | 0.2 | 0.56 | 0.010
Max | NA | 98 | 98 | 32.5
Mean | NA | 11.9 | 15.4 | 0.47
Median | NA | 0.45 | 1.62 | 0.17
98 Max
11.9 Mean
98 Max
15.4 Mean
32.5
Baseline
0.47
Barium, mg/L
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
4/29/2011
10/27/2011
NURE
NWIS
Williams '98 Restricted
Baseline
Sample Dates, Data Ranges, and Means

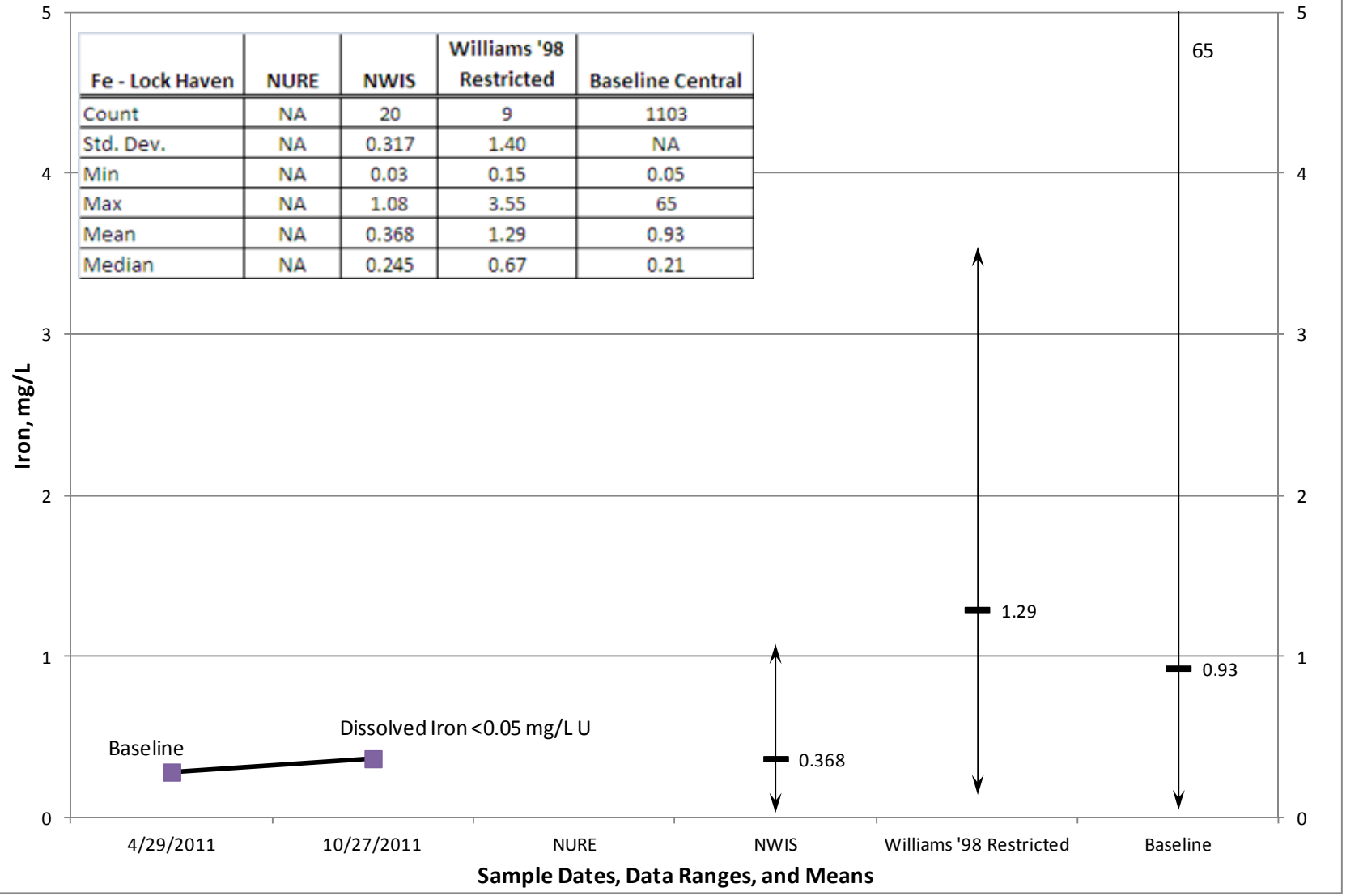
Property Owner C Well Chloride Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Cl - Lock Haven	NURE	NWIS	Williams '98 Restricted	Baseline Central
Count	91	43	11	1440
Std. Dev.	28.5	940	979	NA
Min	0.1	1	125	1.04
Max	228	5050	3500	1980
Mean	16.0	318	693	33.5
Median	8.8	6	336	9.07



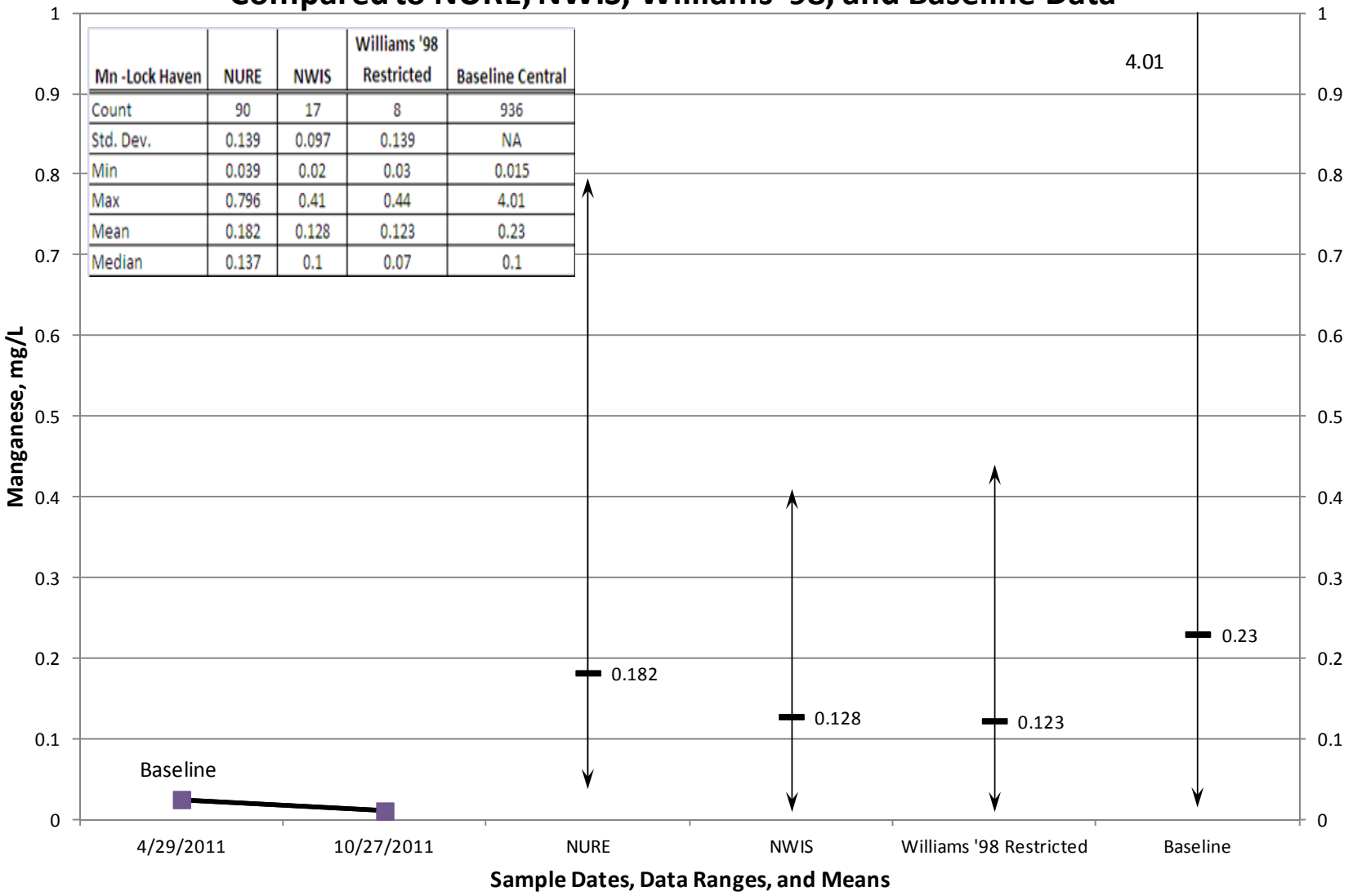
Property Owner C Well Iron Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Fe - Lock Haven	NURE	NWIS	Williams '98 Restricted	Baseline Central
Count	NA	20	9	1103
Std. Dev.	NA	0.317	1.40	NA
Min	NA	0.03	0.15	0.05
Max	NA	1.08	3.55	65
Mean	NA	0.368	1.29	0.93
Median	NA	0.245	0.67	0.21



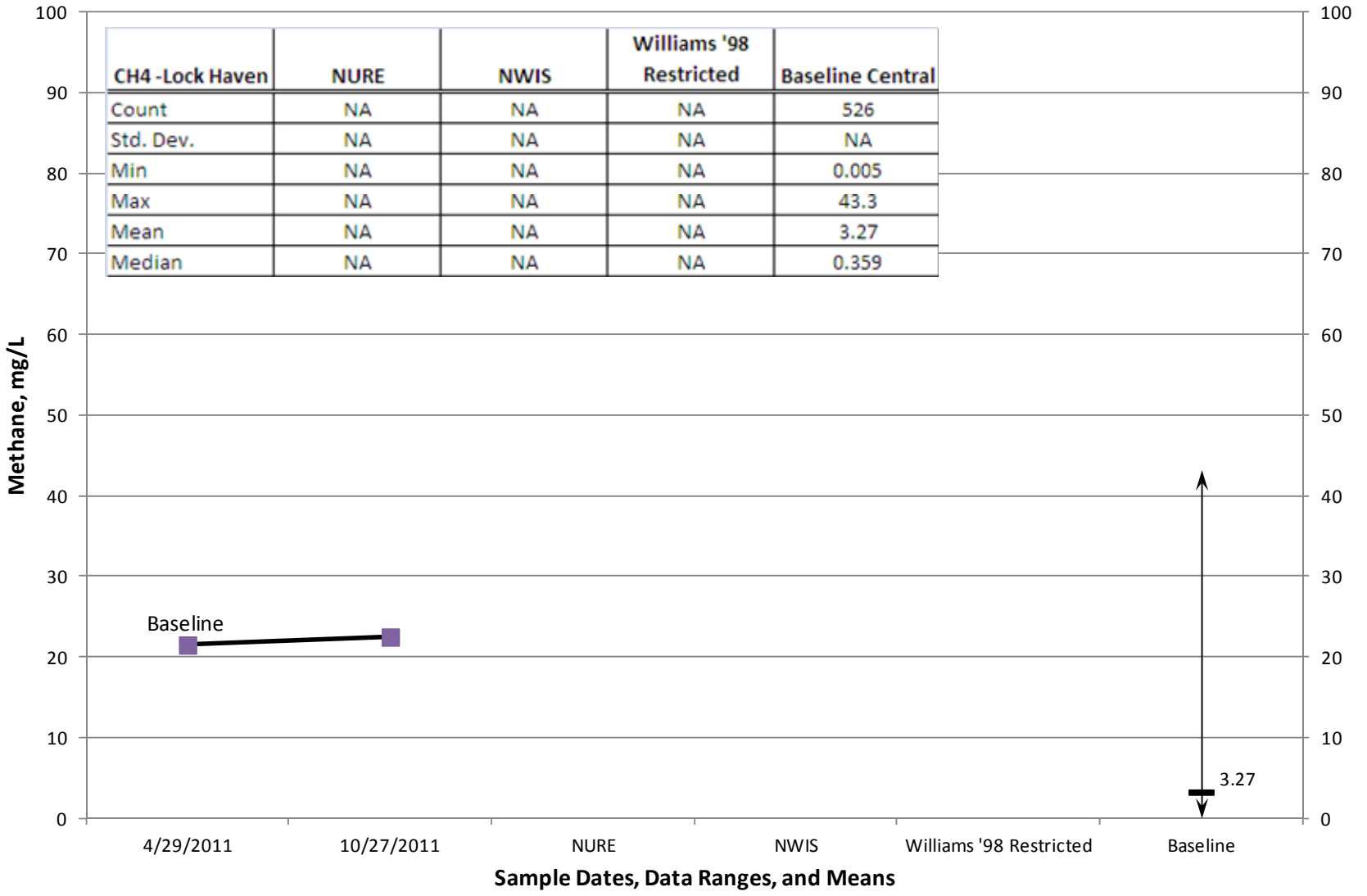
Property Owner C Well Manganese Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

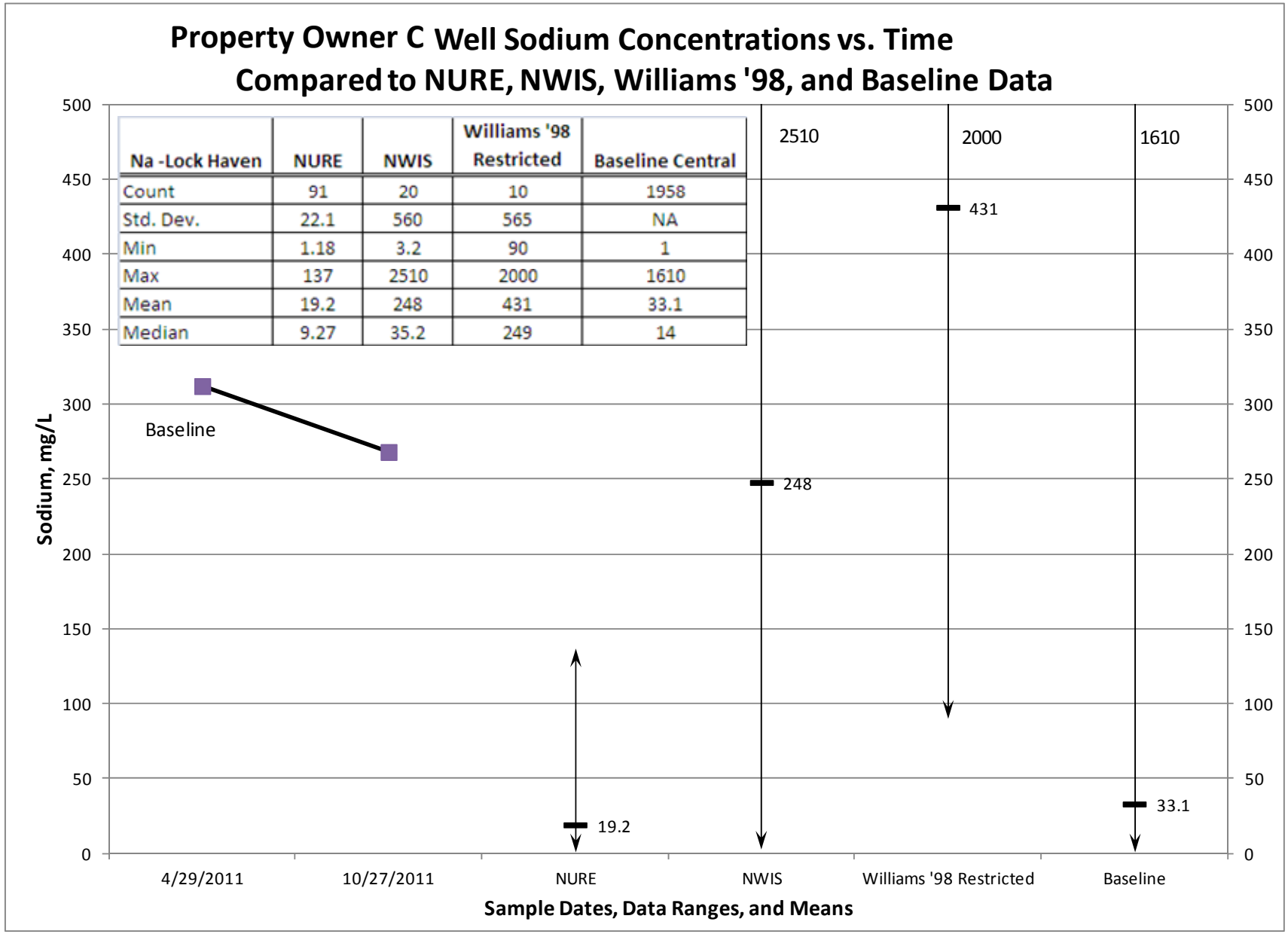
Mn -Lock Haven	NURE	NWIS	Williams '98 Restricted	Baseline Central
Count	90	17	8	936
Std. Dev.	0.139	0.097	0.139	NA
Min	0.039	0.02	0.03	0.015
Max	0.796	0.41	0.44	4.01
Mean	0.182	0.128	0.123	0.23
Median	0.137	0.1	0.07	0.1



Property Owner C Well Methane Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

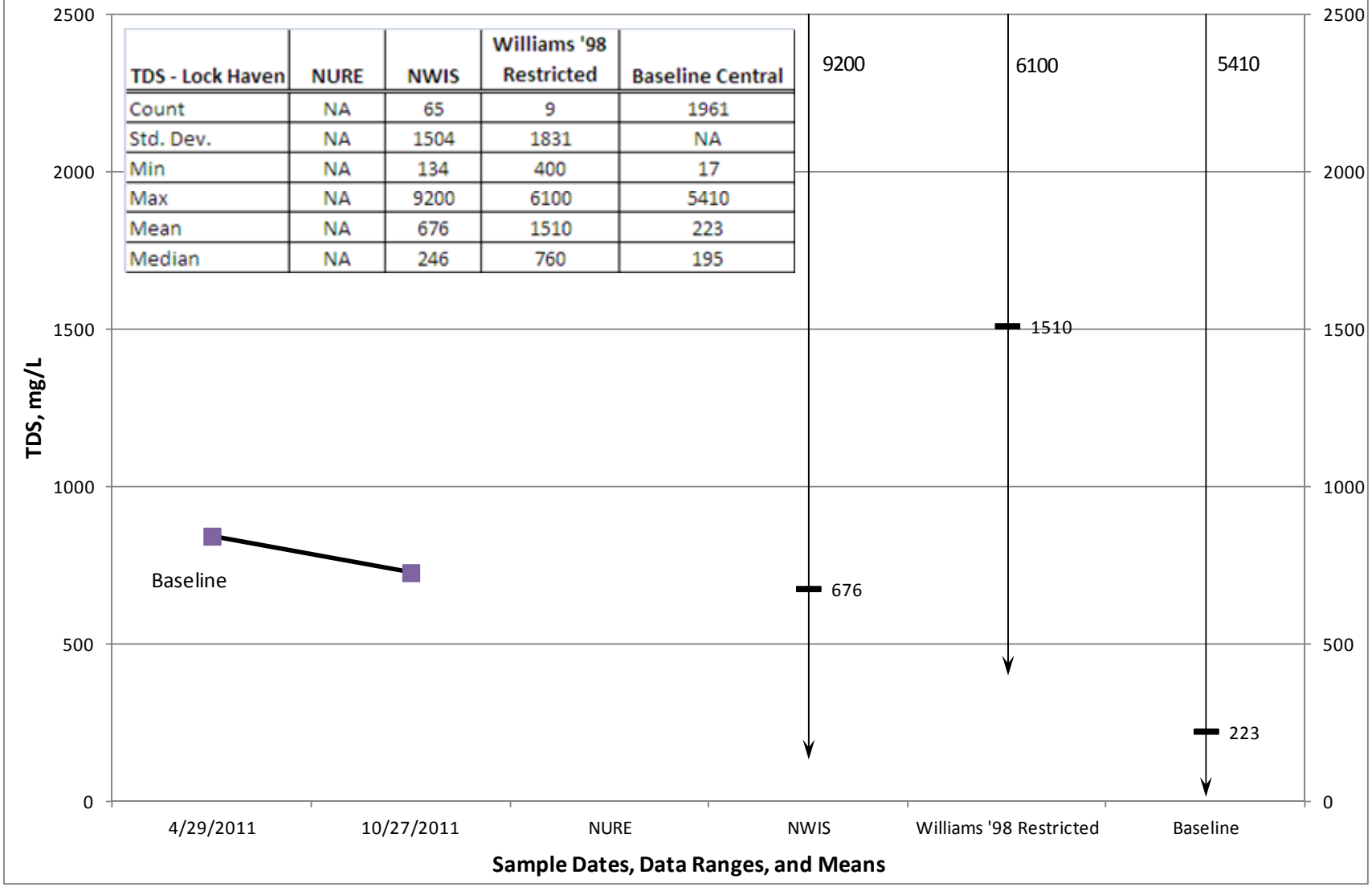
CH4 -Lock Haven	NURE	NWIS	Williams '98 Restricted	Baseline Central
Count	NA	NA	NA	526
Std. Dev.	NA	NA	NA	NA
Min	NA	NA	NA	0.005
Max	NA	NA	NA	43.3
Mean	NA	NA	NA	3.27
Median	NA	NA	NA	0.359




Property Owner C Well Sodium Concentrations vs. Time
Compared to NURE, NWIS, Williams '98, and Baseline Data
Na -Lock Haven | NURE | NWIS | Williams '98 Restricted | Baseline Central
Count | 91 | 20 | 10 | 1958
Std. Dev. | 22.1 | 560 | 565 | NA
Min | 1.18 | 3.2 | 90 | 1
Max | 137 | 2510 | 2000 | 1610
Mean | 19.2 | 248 | 431 | 33.1
Median | 9.27 | 35.2 | 249 | 14
Baseline
2510
2000
1610
431
248
19.2
33.1
Sodium, mg/L
0
50
100
150
200
250
300
350
400
450
500
4/29/2011
10/27/2011
NURE
NWIS
Williams '98 Restricted
Baseline
Sample Dates, Data Ranges, and Means

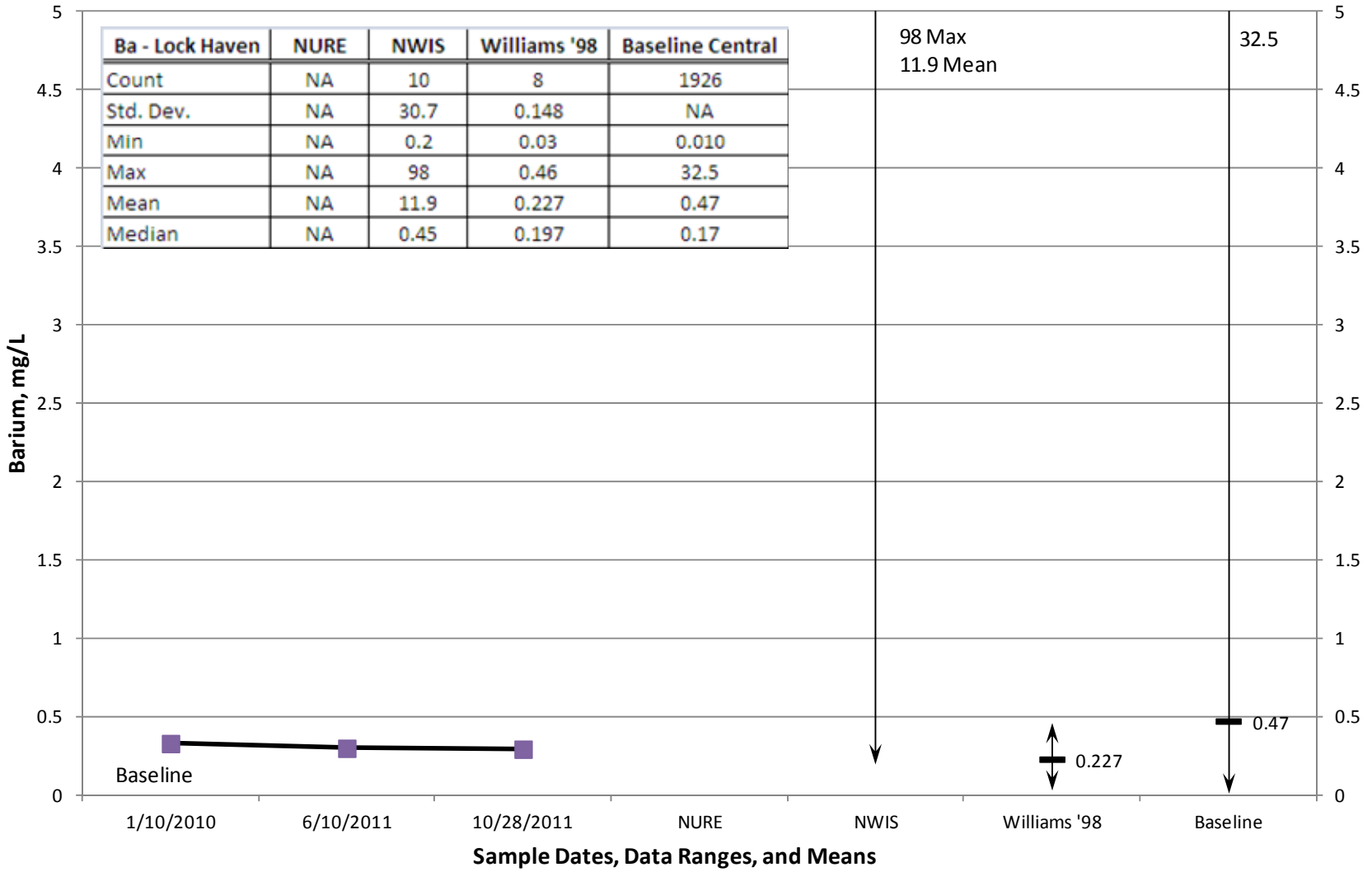
Property Owner C Well TDS Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

TDS - Lock Haven	NURE	NWIS	Williams '98 Restricted	Baseline Central
Count	NA	65	9	1961
Std. Dev.	NA	1504	1831	NA
Min	NA	134	400	17
Max	NA	9200	6100	5410
Mean	NA	676	1510	223
Median	NA	246	760	195



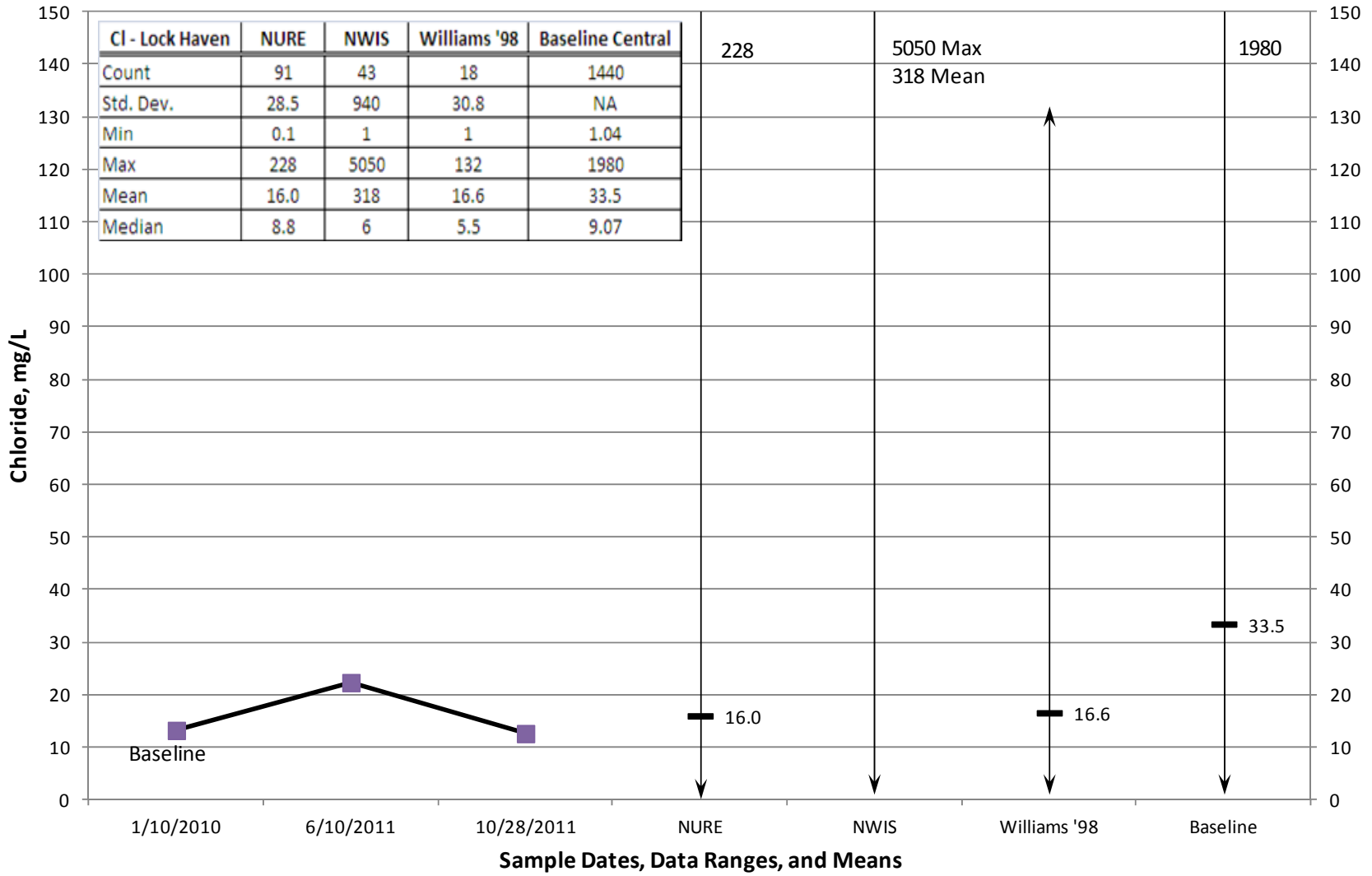
APPENDIX D-4
TIME PLOTS
PROPERTY OWNER D

Property Owner D Well Barium Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data



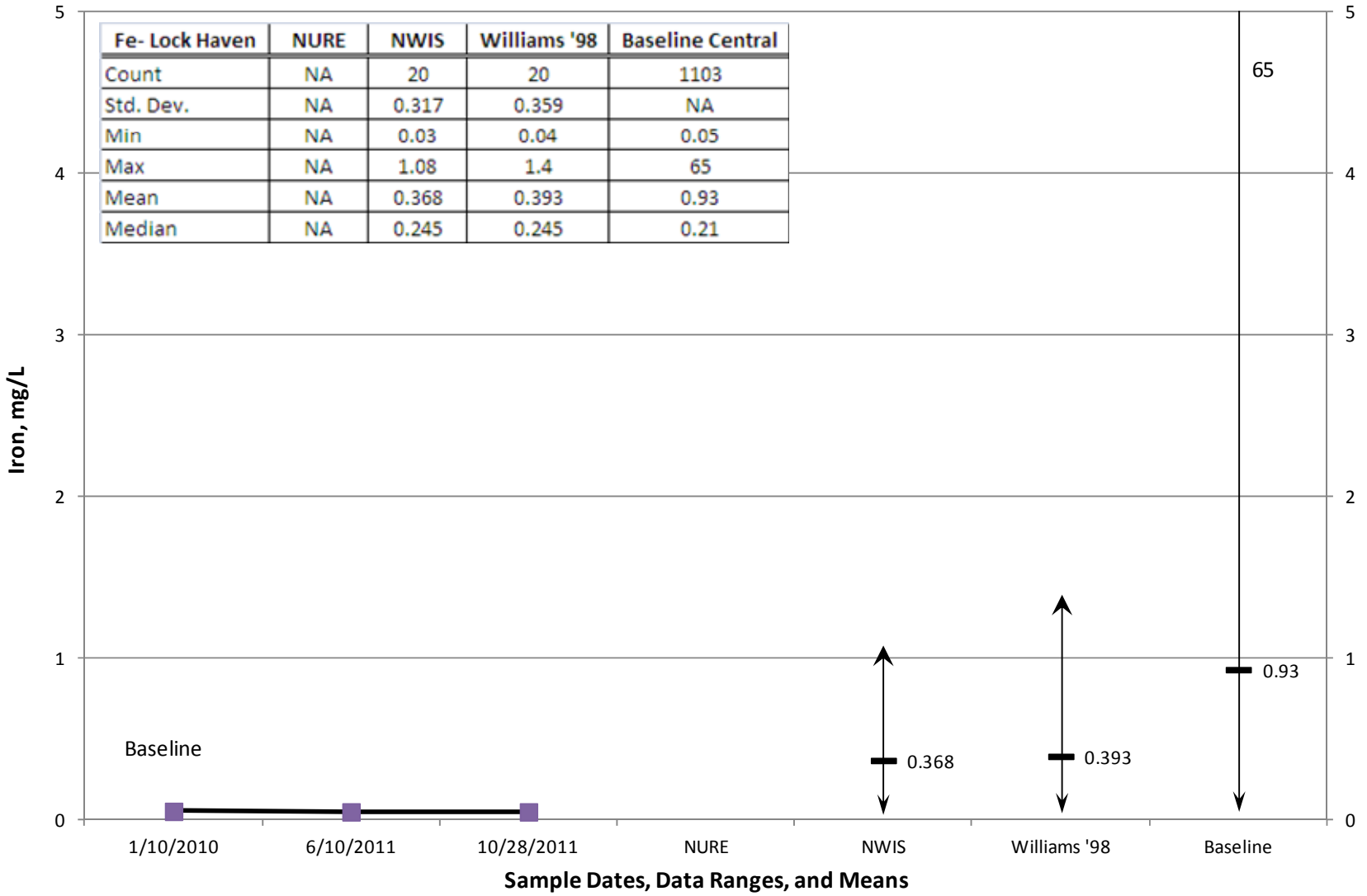
Property Owner D Well Chloride Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Cl - Lock Haven	NURE	NWIS	Williams '98	Baseline Central
Count	91	43	18	1440
Std. Dev.	28.5	940	30.8	NA
Min	0.1	1	1	1.04
Max	228	5050	132	1980
Mean	16.0	318	16.6	33.5
Median	8.8	6	5.5	9.07



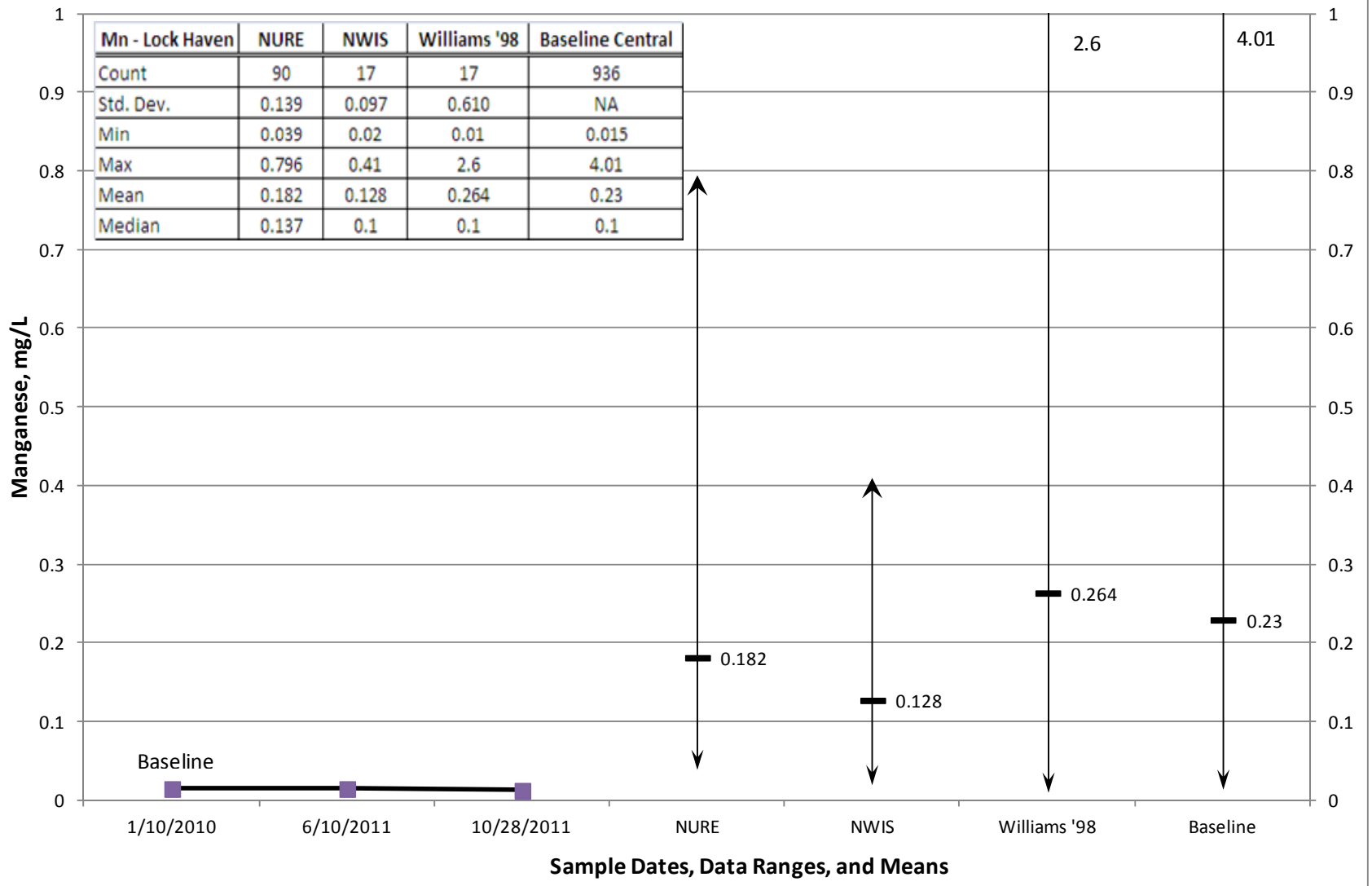
Property Owner D Well Iron Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Fe- Lock Haven	NURE	NWIS	Williams '98	Baseline Central
Count	NA	20	20	1103
Std. Dev.	NA	0.317	0.359	NA
Min	NA	0.03	0.04	0.05
Max	NA	1.08	1.4	65
Mean	NA	0.368	0.393	0.93
Median	NA	0.245	0.245	0.21



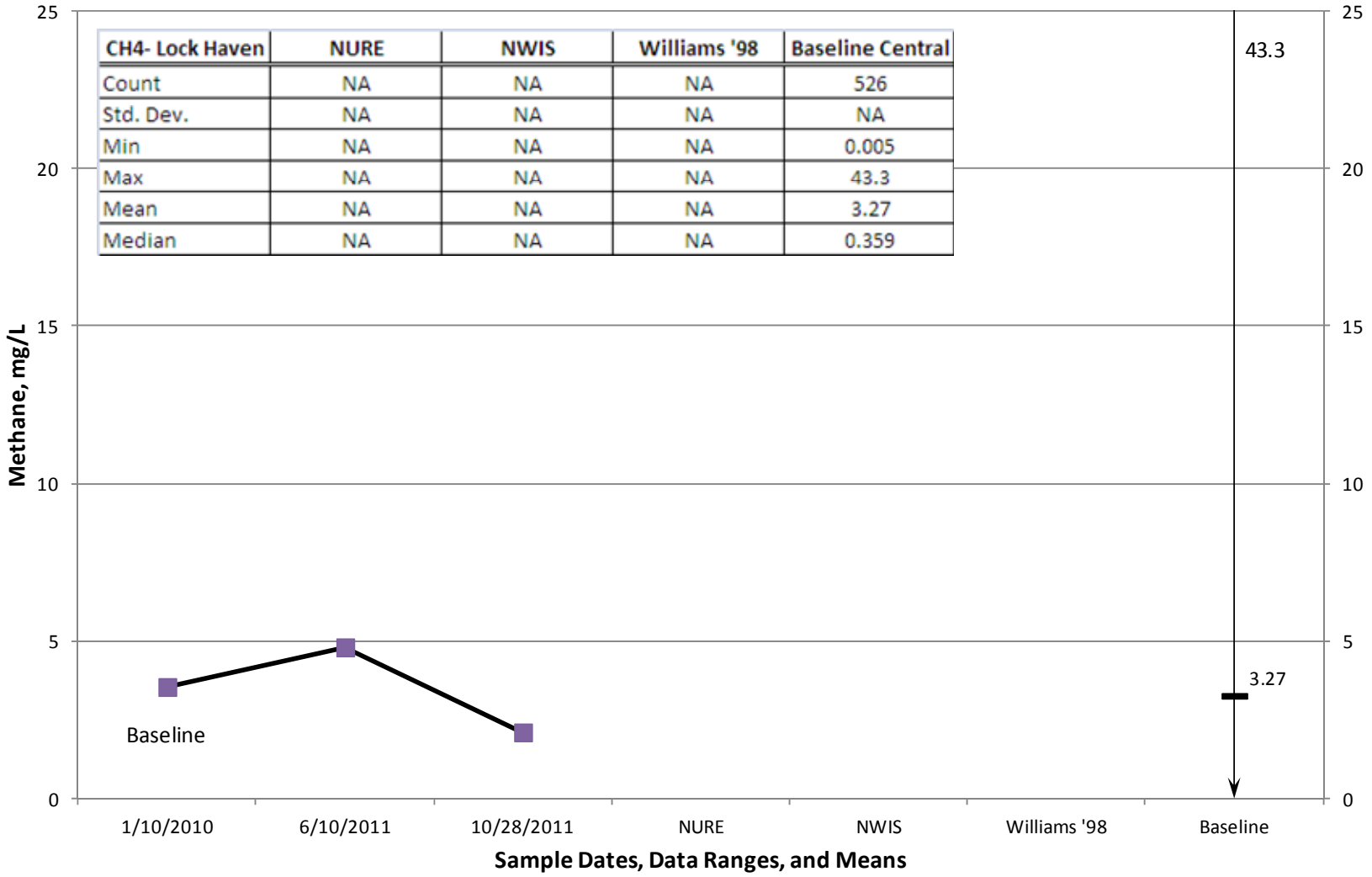
Property Owner D Well Manganese Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Mn - Lock Haven	NURE	NWIS	Williams '98	Baseline Central
Count	90	17	17	936
Std. Dev.	0.139	0.097	0.610	NA
Min	0.039	0.02	0.01	0.015
Max	0.796	0.41	2.6	4.01
Mean	0.182	0.128	0.264	0.23
Median	0.137	0.1	0.1	0.1



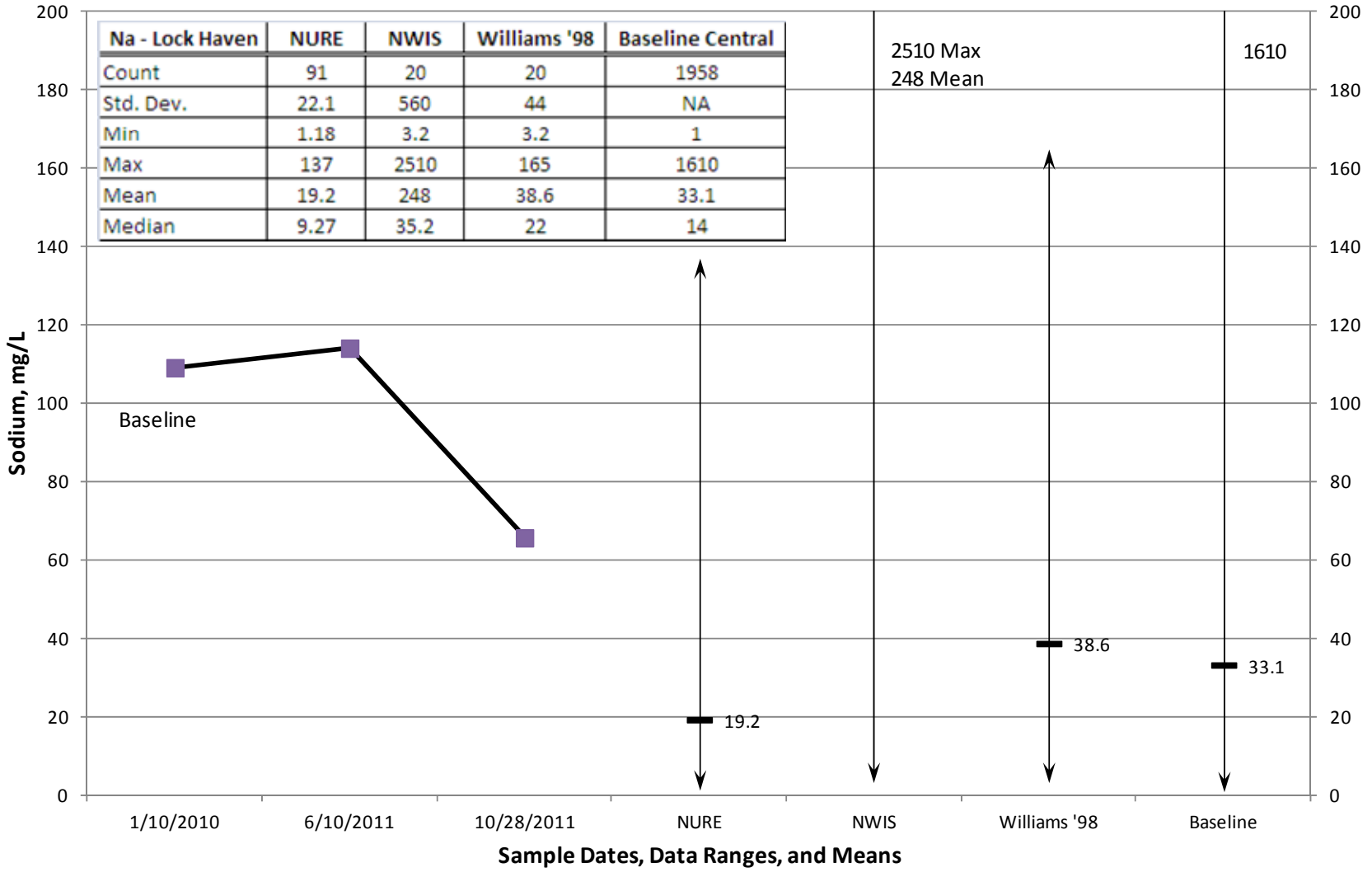
Property Owner D Well Methane Concentrations vs. Time Compared to NURE,NWIS, Williams '98, and Baseline Data

CH4- Lock Haven	NURE	NWIS	Williams '98	Baseline Central
Count	NA	NA	NA	526
Std. Dev.	NA	NA	NA	NA
Min	NA	NA	NA	0.005
Max	NA	NA	NA	43.3
Mean	NA	NA	NA	3.27
Median	NA	NA	NA	0.359



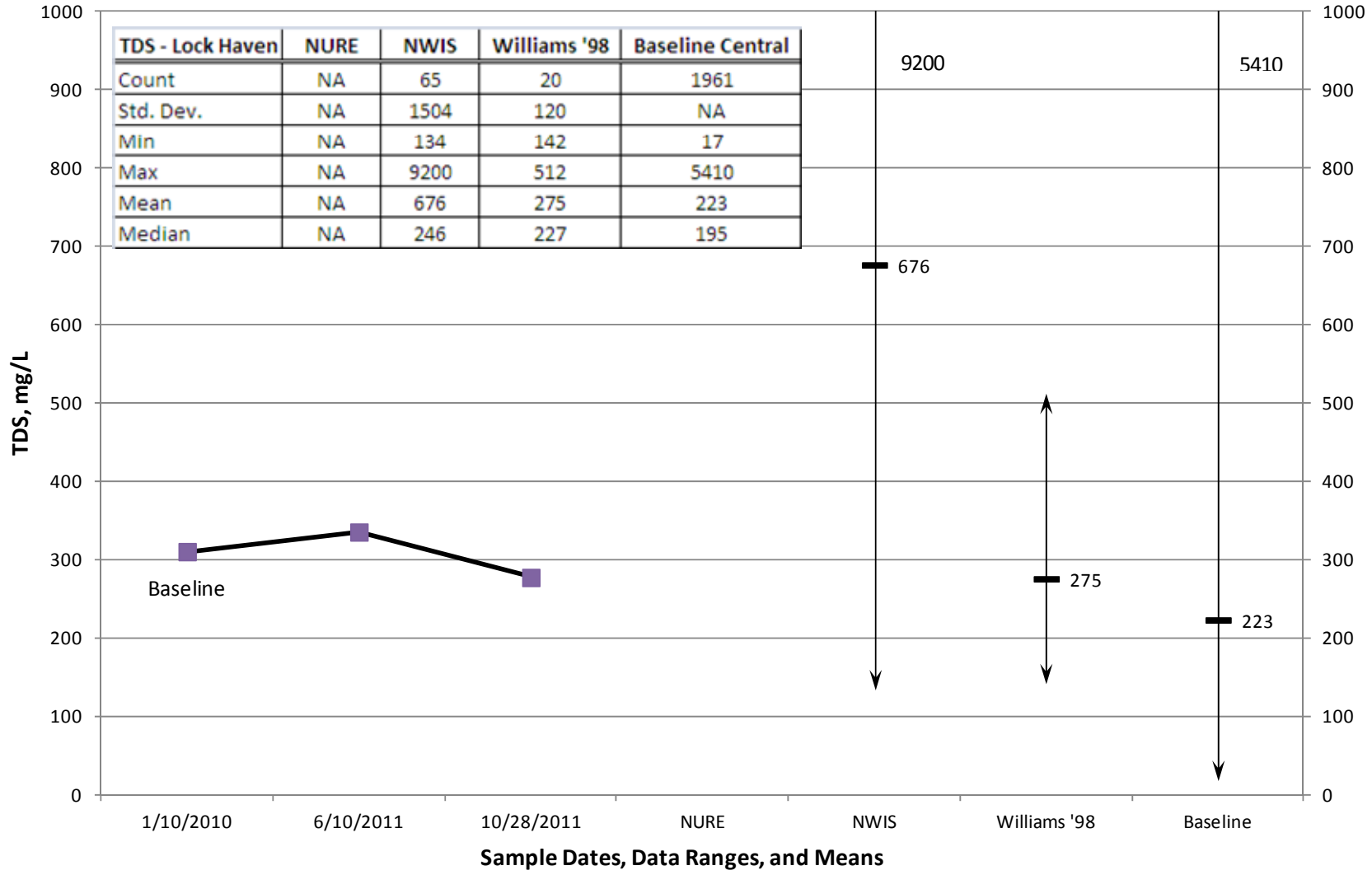
Property Owner D Well Sodium Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Na - Lock Haven	NURE	NWIS	Williams '98	Baseline Central
Count	91	20	20	1958
Std. Dev.	22.1	560	44	NA
Min	1.18	3.2	3.2	1
Max	137	2510	165	1610
Mean	19.2	248	38.6	33.1
Median	9.27	35.2	22	14



Property Owner D Well TDS Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

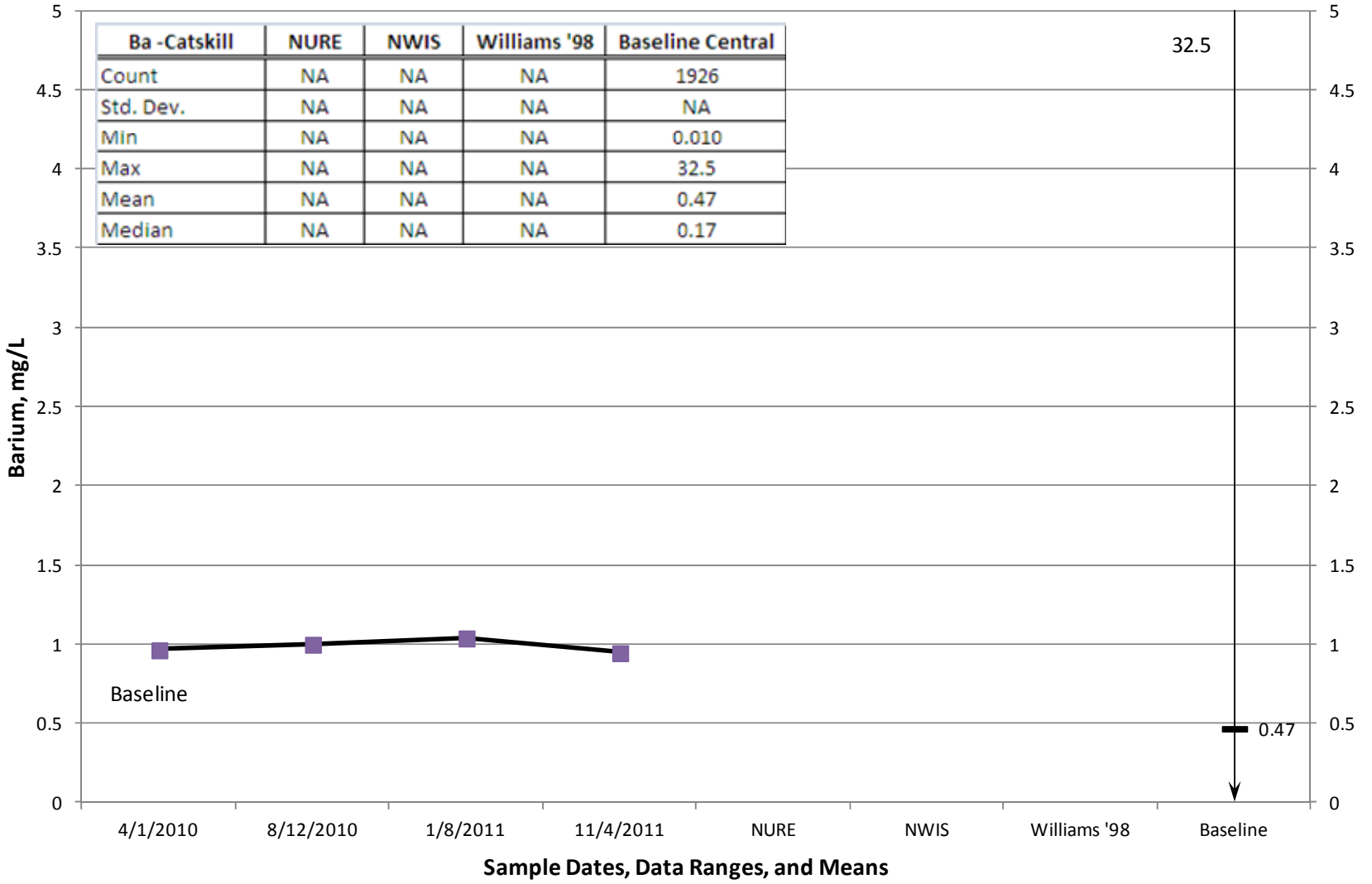
TDS - Lock Haven	NURE	NWIS	Williams '98	Baseline Central
Count	NA	65	20	1961
Std. Dev.	NA	1504	120	NA
Min	NA	134	142	17
Max	NA	9200	512	5410
Mean	NA	676	275	223
Median	NA	246	227	195



APPENDIX D-5
TIME PLOTS
PROPERTY OWNER E (115-FT)

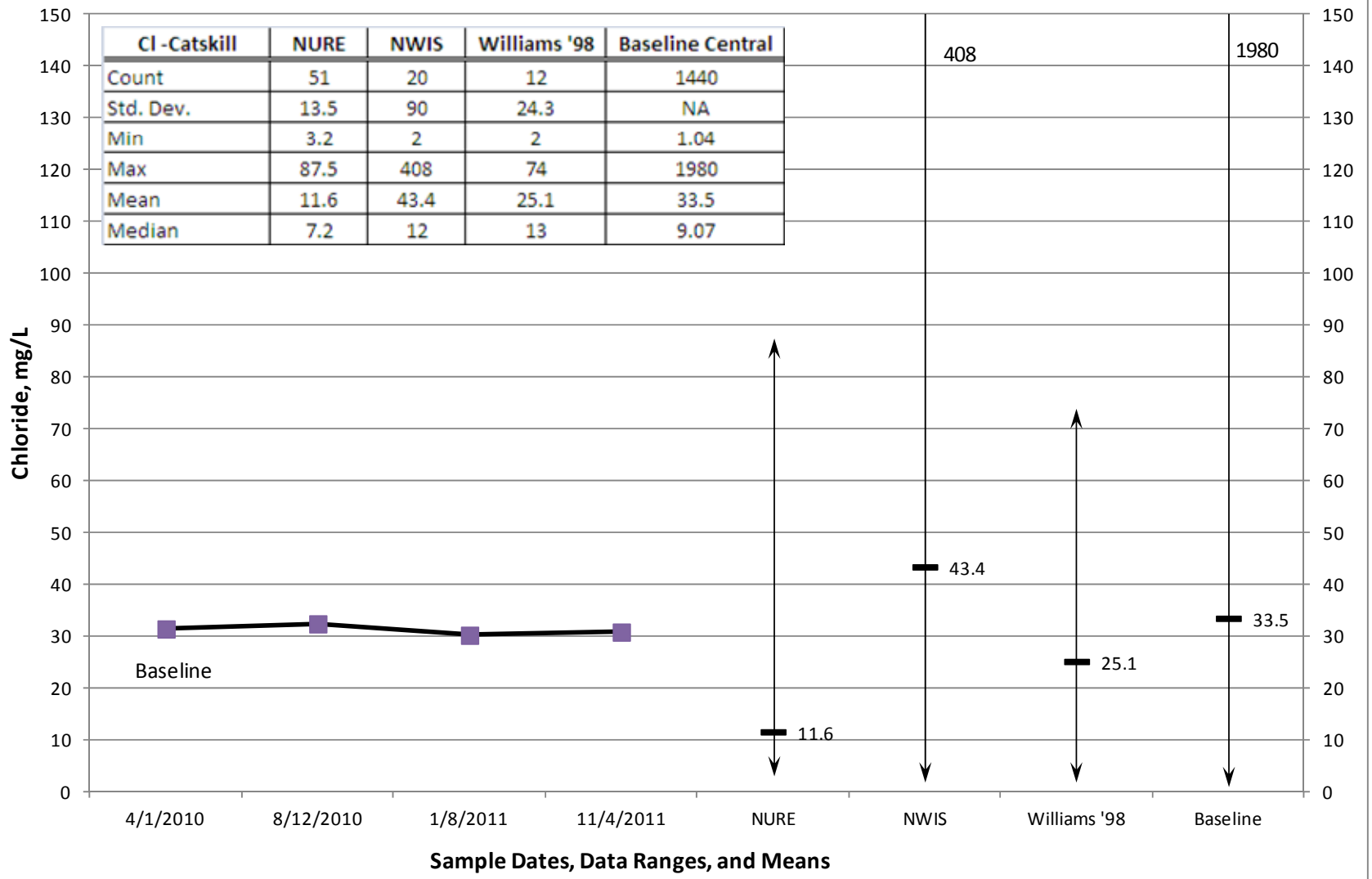
Property Owner E (115 ft.) Well Barium Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Ba -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	NA	NA	NA	1926
Std. Dev.	NA	NA	NA	NA
Min	NA	NA	NA	0.010
Max	NA	NA	NA	32.5
Mean	NA	NA	NA	0.47
Median	NA	NA	NA	0.17



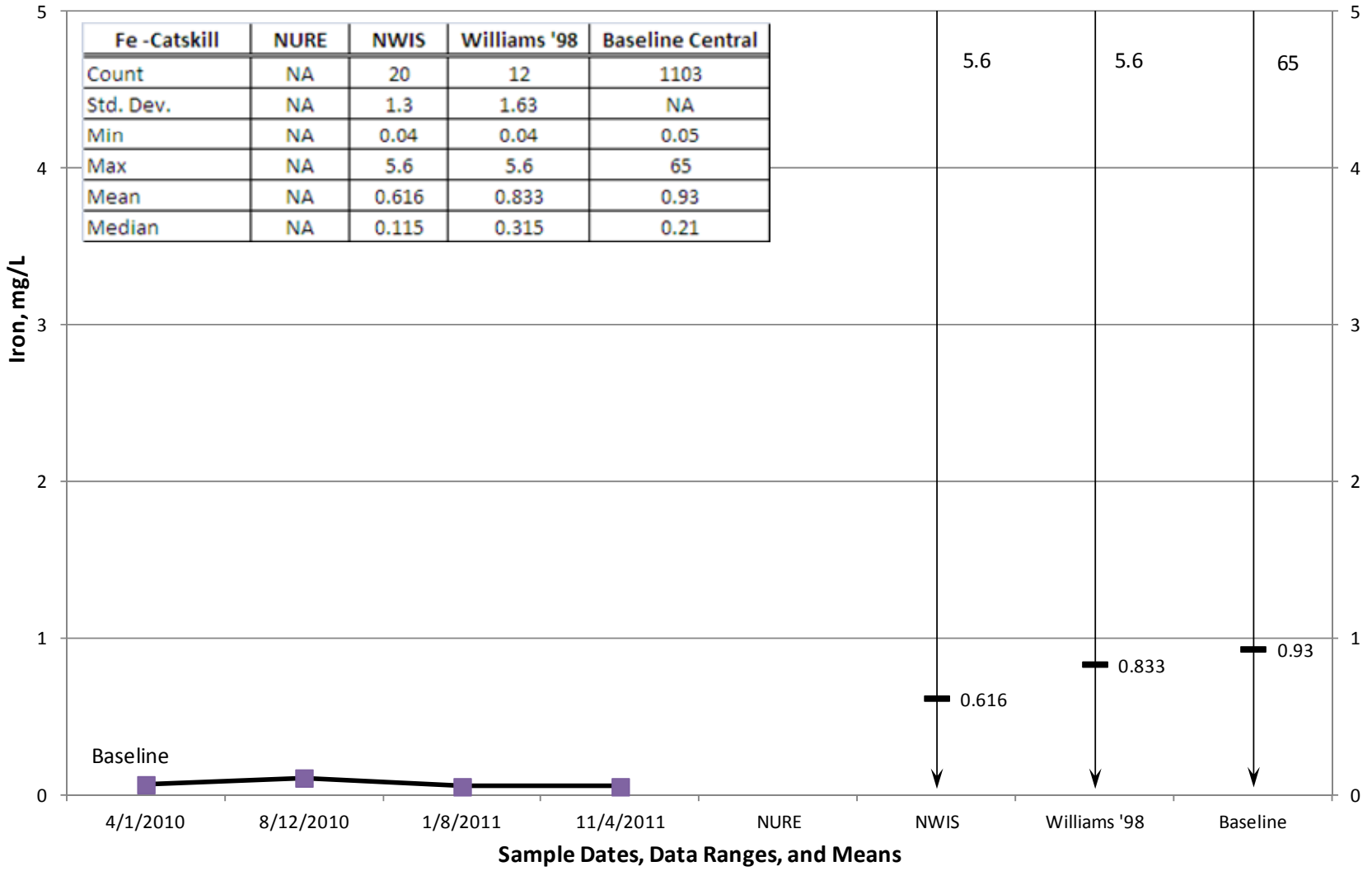
Property Owner E (115 ft.) Well Chloride Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Cl -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	51	20	12	1440
Std. Dev.	13.5	90	24.3	NA
Min	3.2	2	2	1.04
Max	87.5	408	74	1980
Mean	11.6	43.4	25.1	33.5
Median	7.2	12	13	9.07



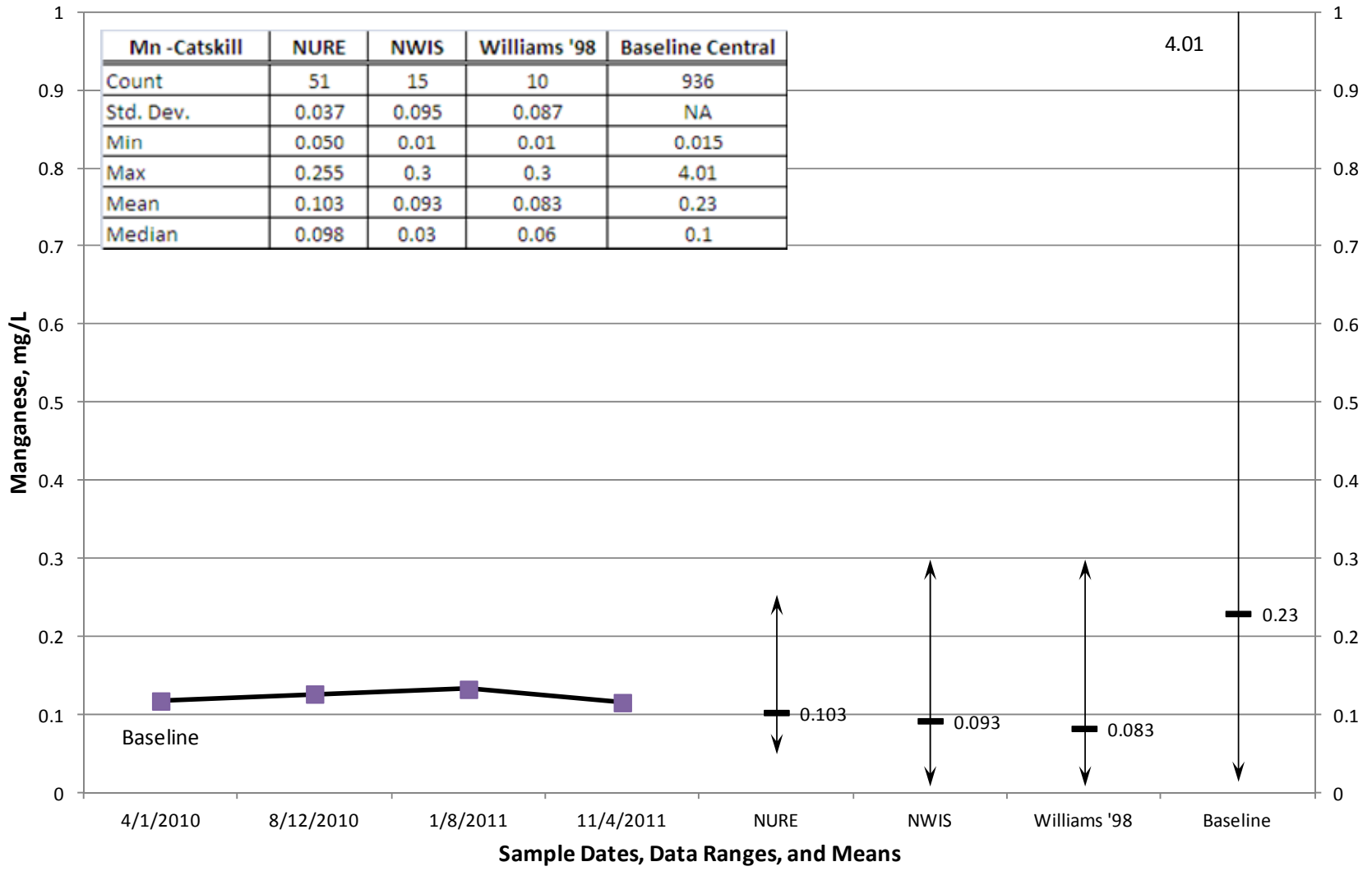
Property Owner E (115 ft.) Well Iron Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Fe -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	NA	20	12	1103
Std. Dev.	NA	1.3	1.63	NA
Min	NA	0.04	0.04	0.05
Max	NA	5.6	5.6	65
Mean	NA	0.616	0.833	0.93
Median	NA	0.115	0.315	0.21



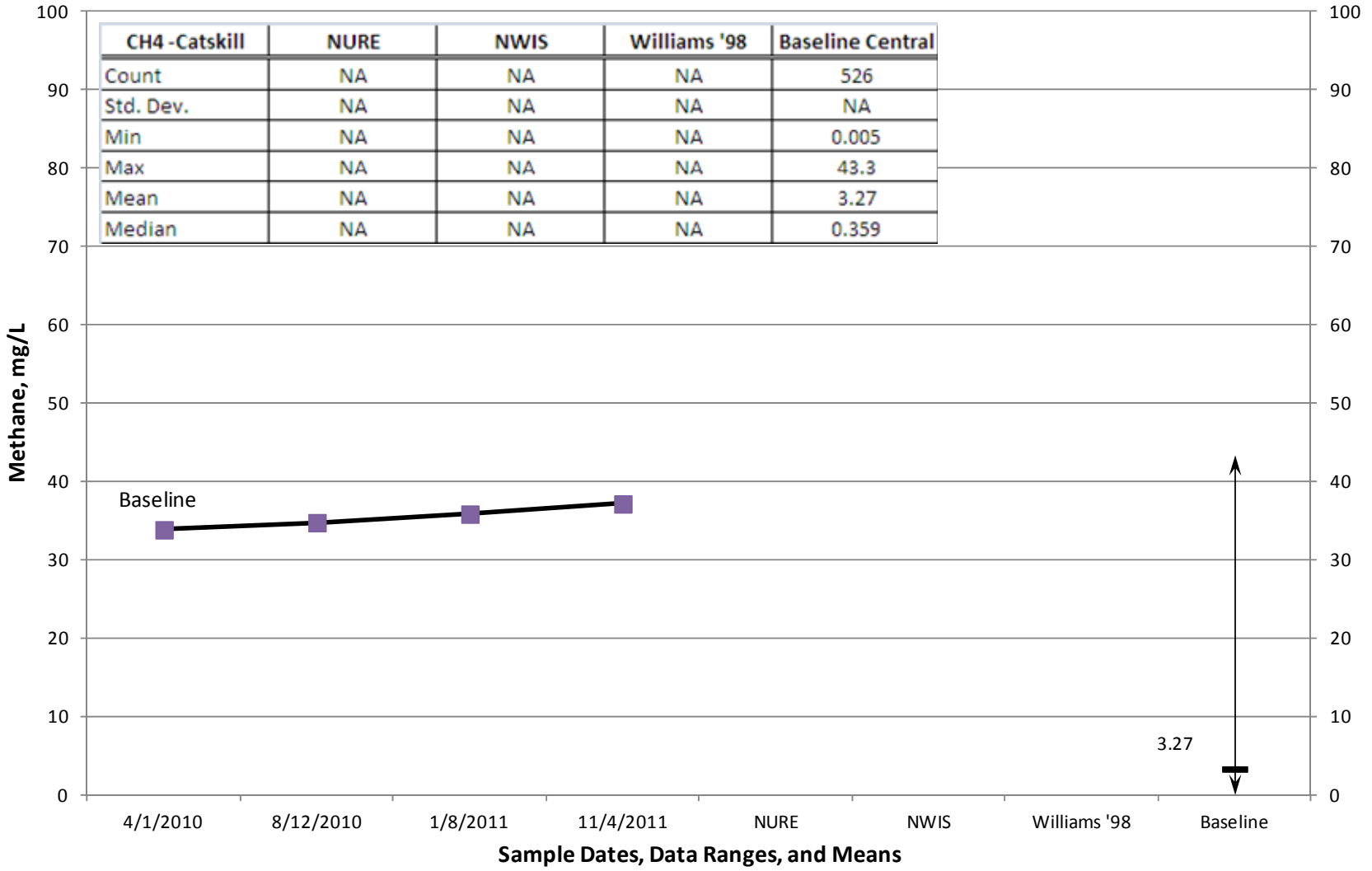
Property Owner E (115 ft.) Well Manganese Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Mn -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	51	15	10	936
Std. Dev.	0.037	0.095	0.087	NA
Min	0.050	0.01	0.01	0.015
Max	0.255	0.3	0.3	4.01
Mean	0.103	0.093	0.083	0.23
Median	0.098	0.03	0.06	0.1



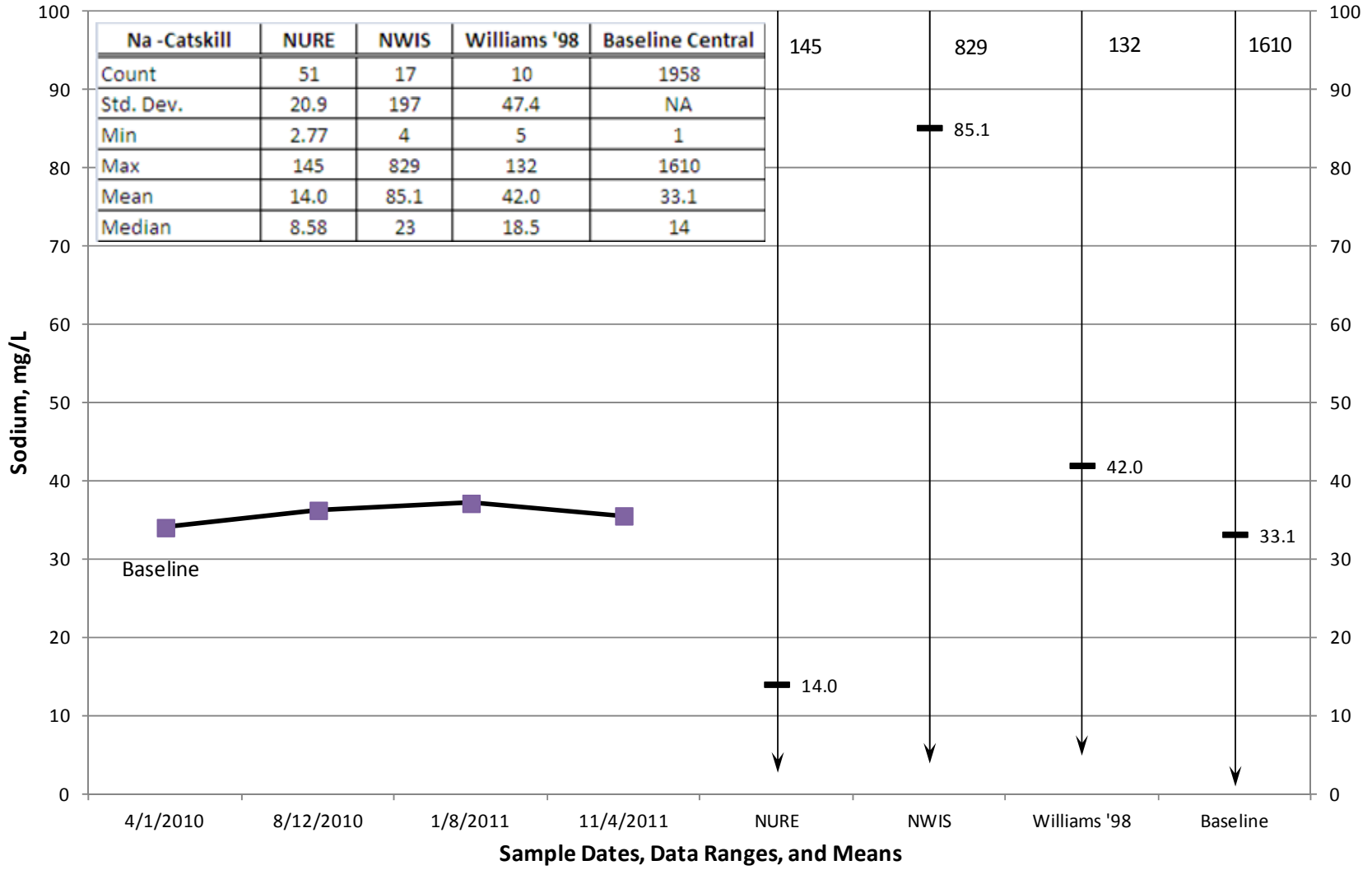
Property Owner E (115 ft.) Well Methane Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

CH4 -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	NA	NA	NA	526
Std. Dev.	NA	NA	NA	NA
Min	NA	NA	NA	0.005
Max	NA	NA	NA	43.3
Mean	NA	NA	NA	3.27
Median	NA	NA	NA	0.359



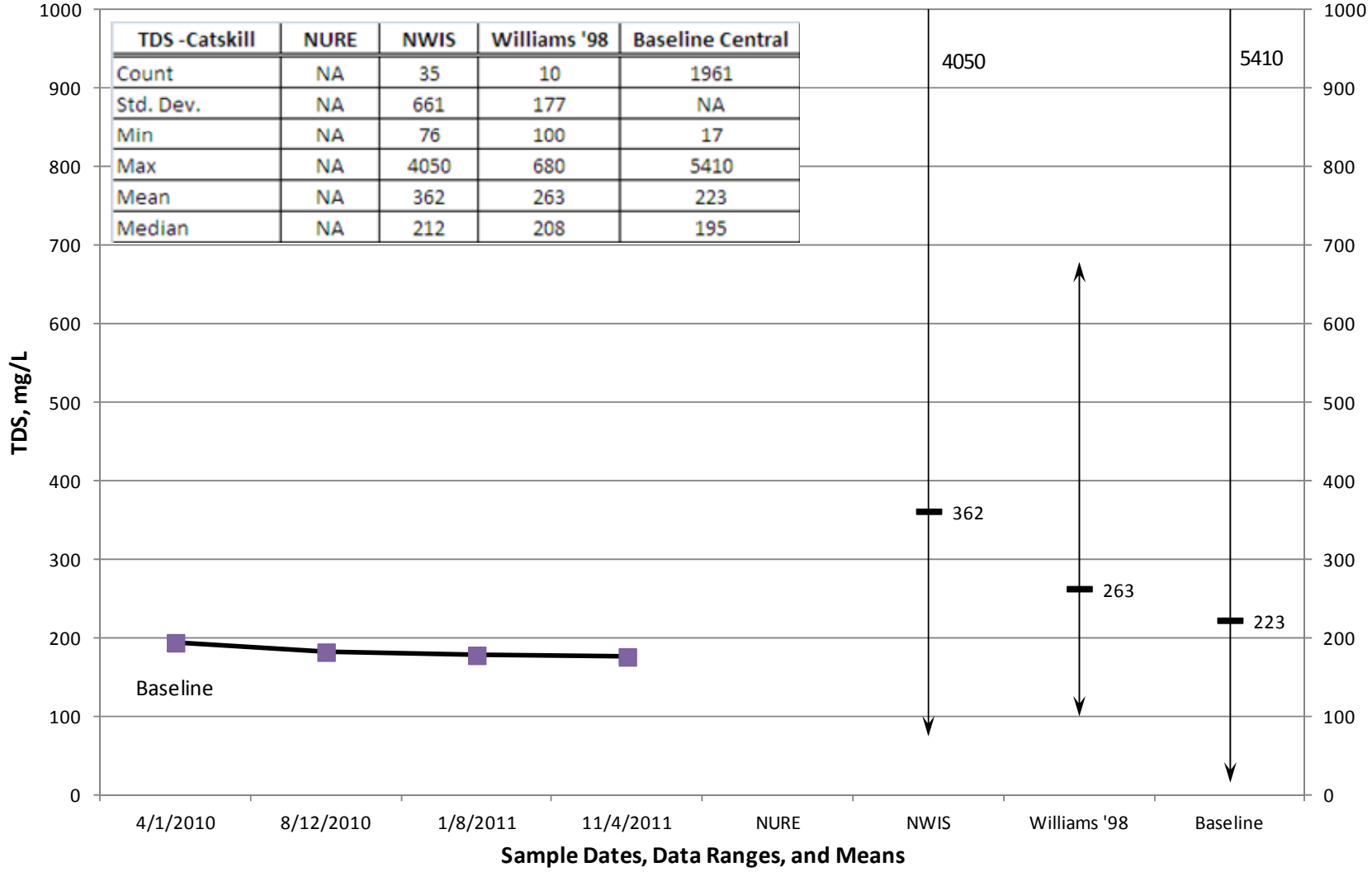
Property Owner E (115 ft.) Well Sodium Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Na -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	51	17	10	1958
Std. Dev.	20.9	197	47.4	NA
Min	2.77	4	5	1
Max	145	829	132	1610
Mean	14.0	85.1	42.0	33.1
Median	8.58	23	18.5	14



Property Owner E (115 ft.) Well TDS Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

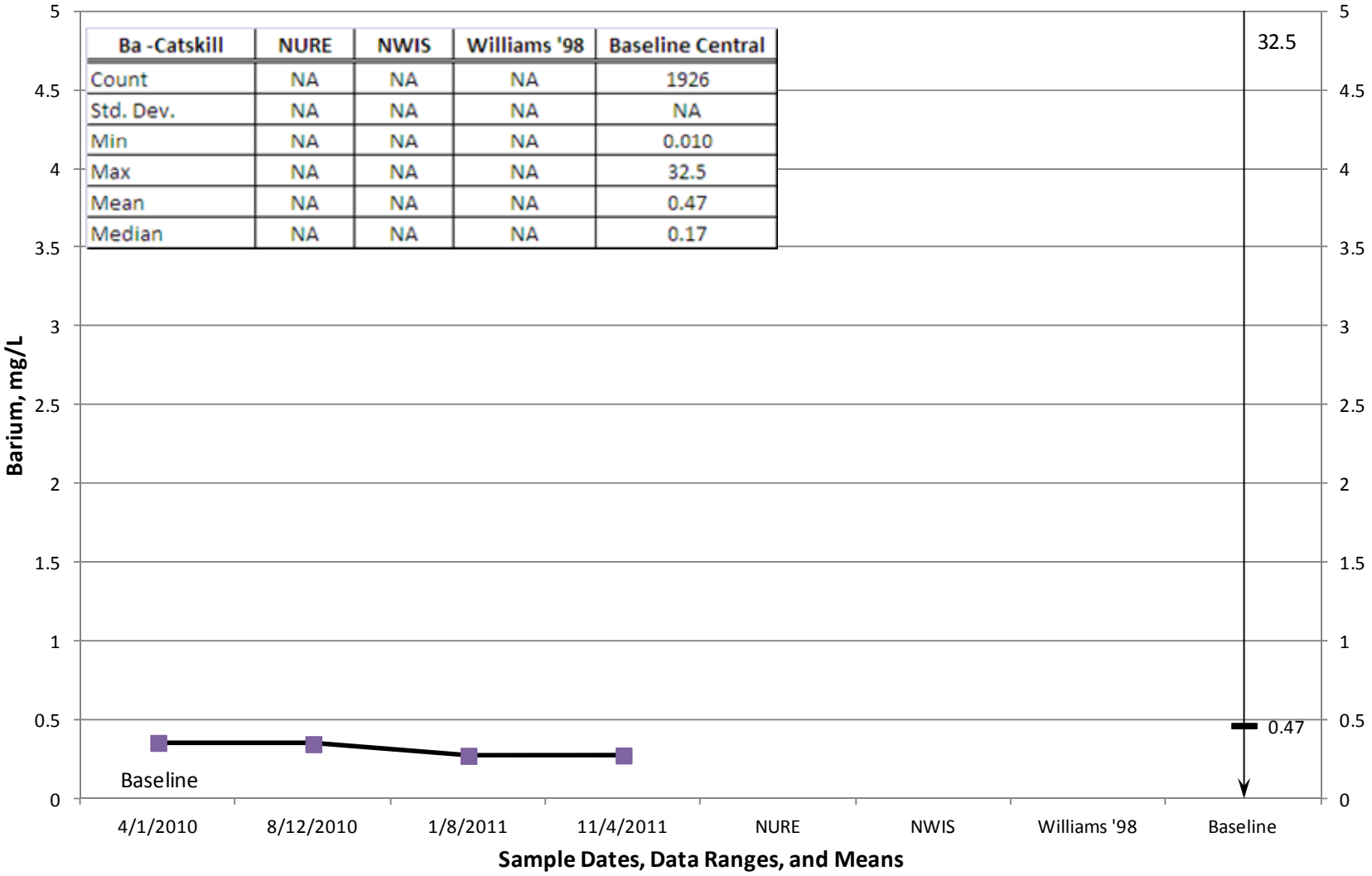
TDS -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	NA	35	10	1961
Std. Dev.	NA	661	177	NA
Min	NA	76	100	17
Max	NA	4050	680	5410
Mean	NA	362	263	223
Median	NA	212	208	195



APPENDIX D-6
TIME PLOTS
PROPERTY OWNER E (185-FT)

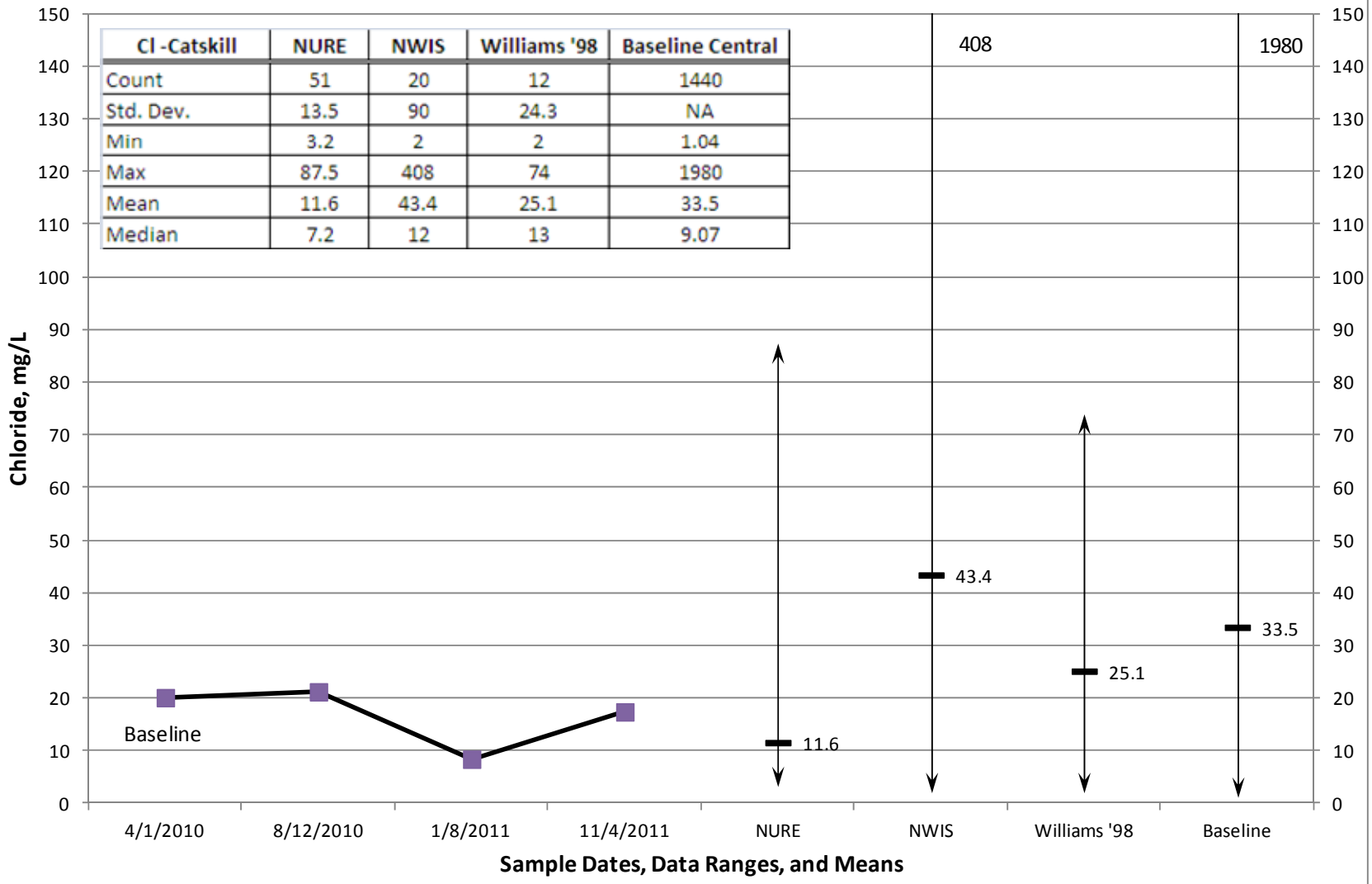
Property Owner E (185 ft.) Well Barium Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Ba -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	NA	NA	NA	1926
Std. Dev.	NA	NA	NA	NA
Min	NA	NA	NA	0.010
Max	NA	NA	NA	32.5
Mean	NA	NA	NA	0.47
Median	NA	NA	NA	0.17



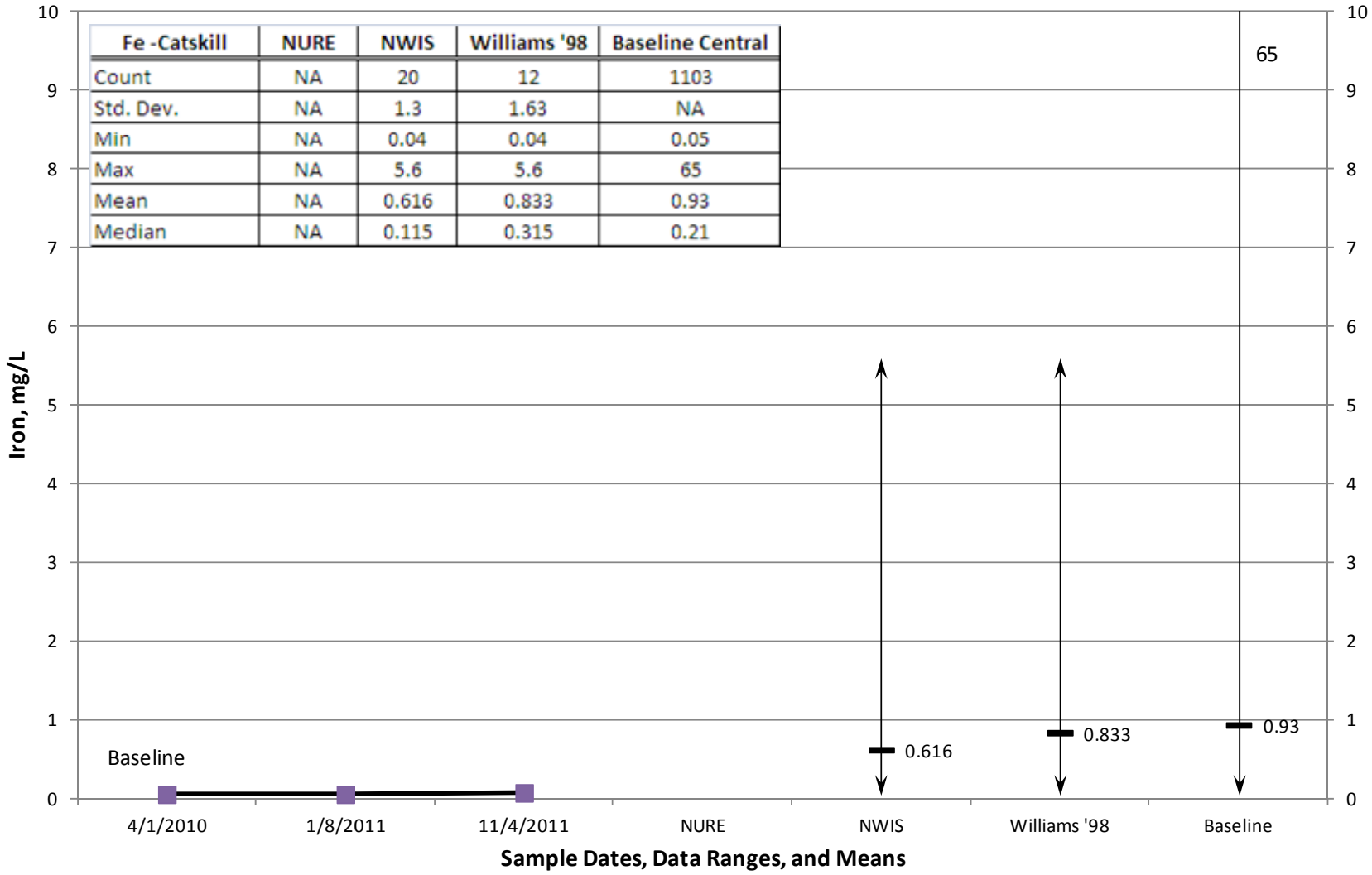
Property Owner E (185 ft.) Well Chloride Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Cl -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	51	20	12	1440
Std. Dev.	13.5	90	24.3	NA
Min	3.2	2	2	1.04
Max	87.5	408	74	1980
Mean	11.6	43.4	25.1	33.5
Median	7.2	12	13	9.07



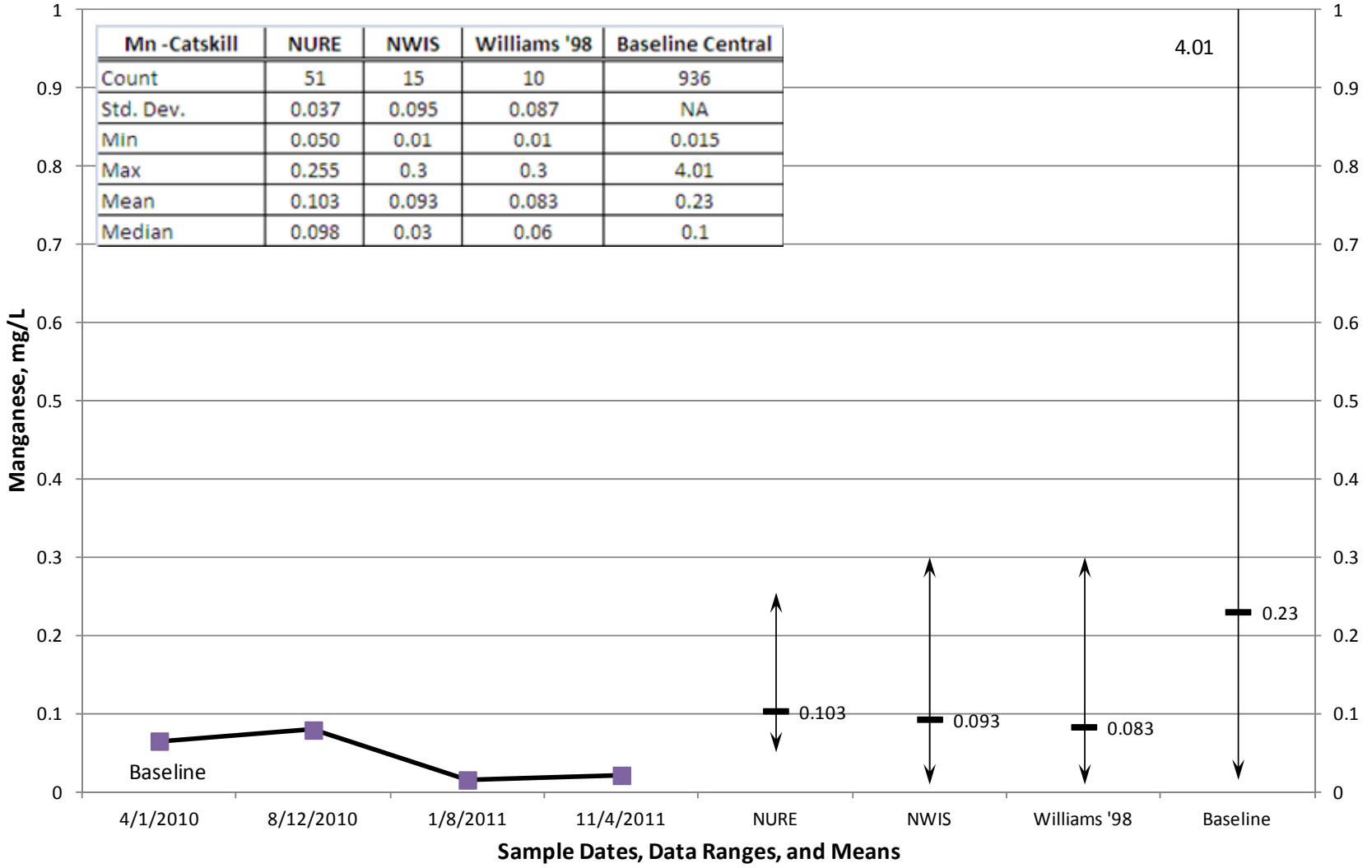
Property Owner E (185 ft.) Well Iron Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Fe -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	NA	20	12	1103
Std. Dev.	NA	1.3	1.63	NA
Min	NA	0.04	0.04	0.05
Max	NA	5.6	5.6	65
Mean	NA	0.616	0.833	0.93
Median	NA	0.115	0.315	0.21



Property Owner E (185 ft.) Well Manganese Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Mn -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	51	15	10	936
Std. Dev.	0.037	0.095	0.087	NA
Min	0.050	0.01	0.01	0.015
Max	0.255	0.3	0.3	4.01
Mean	0.103	0.093	0.083	0.23
Median	0.098	0.03	0.06	0.1

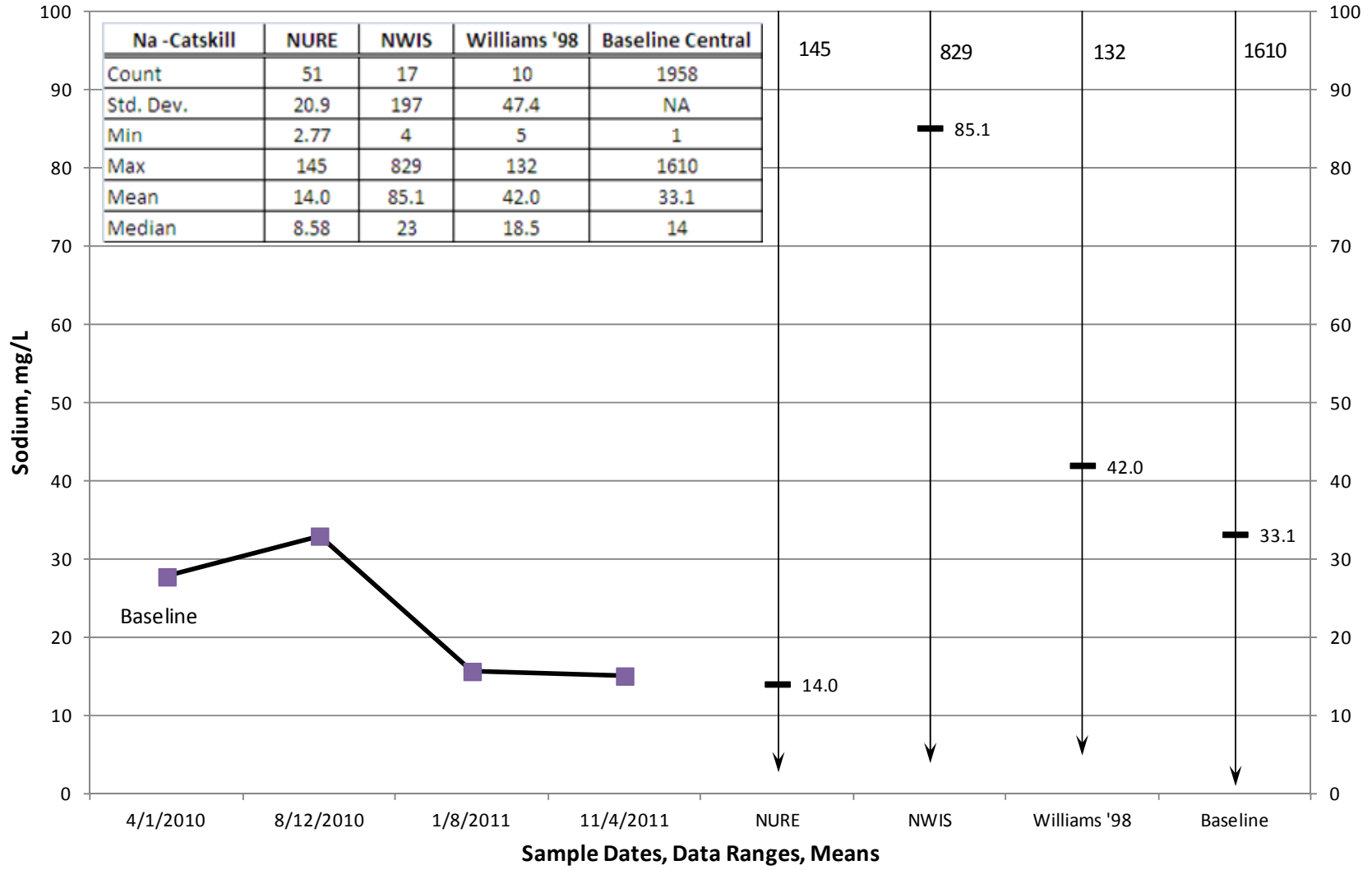


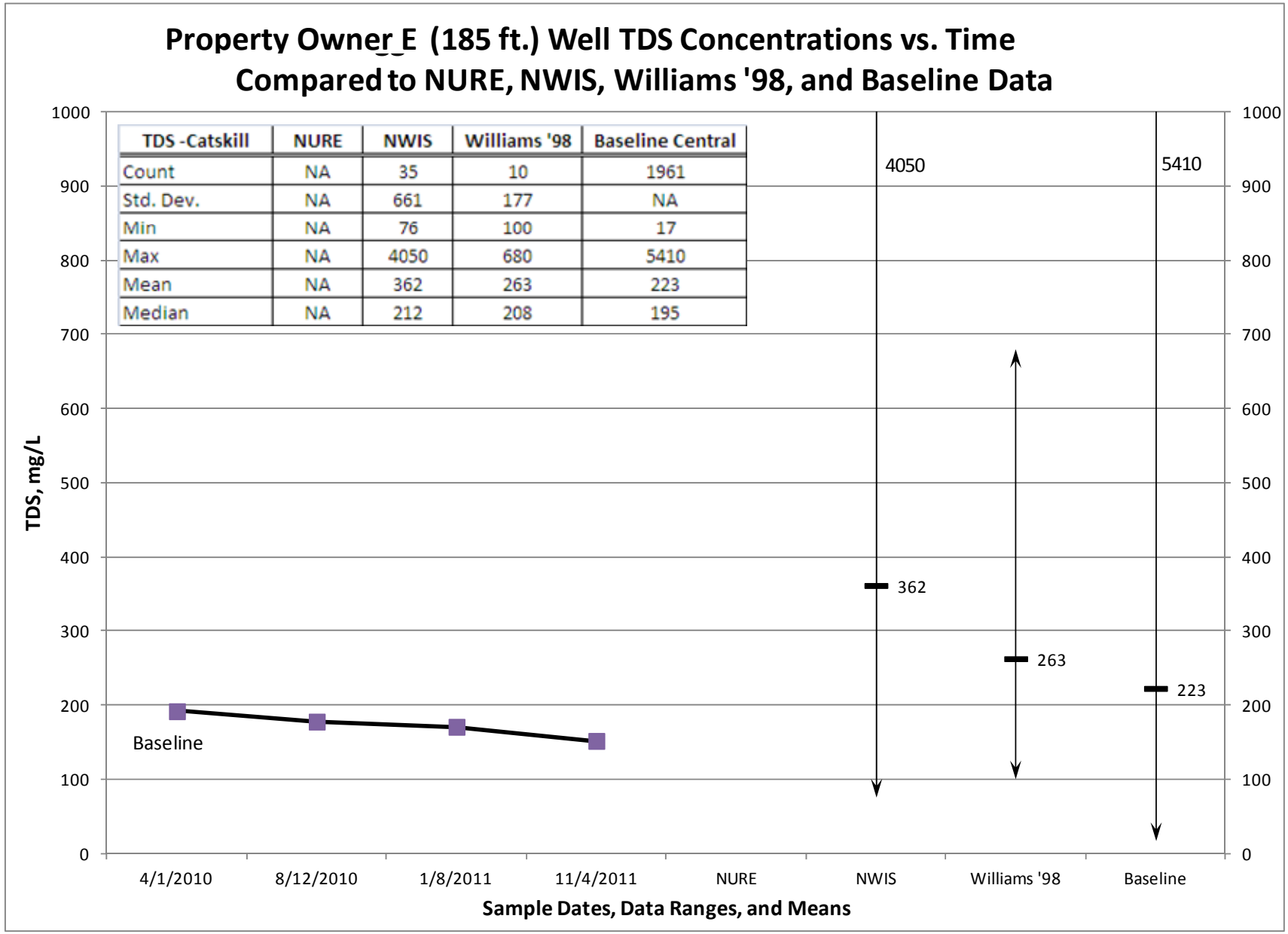
Property Owner E (185 ft.) Well Methane Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

CH4 -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	NA	NA	NA	526
Std. Dev.	NA	NA	NA	NA
Min	NA	NA	NA	0.005
Max	NA	NA	NA	43.3
Mean	NA	NA	NA	3.27
Median	NA	NA	NA	0.359

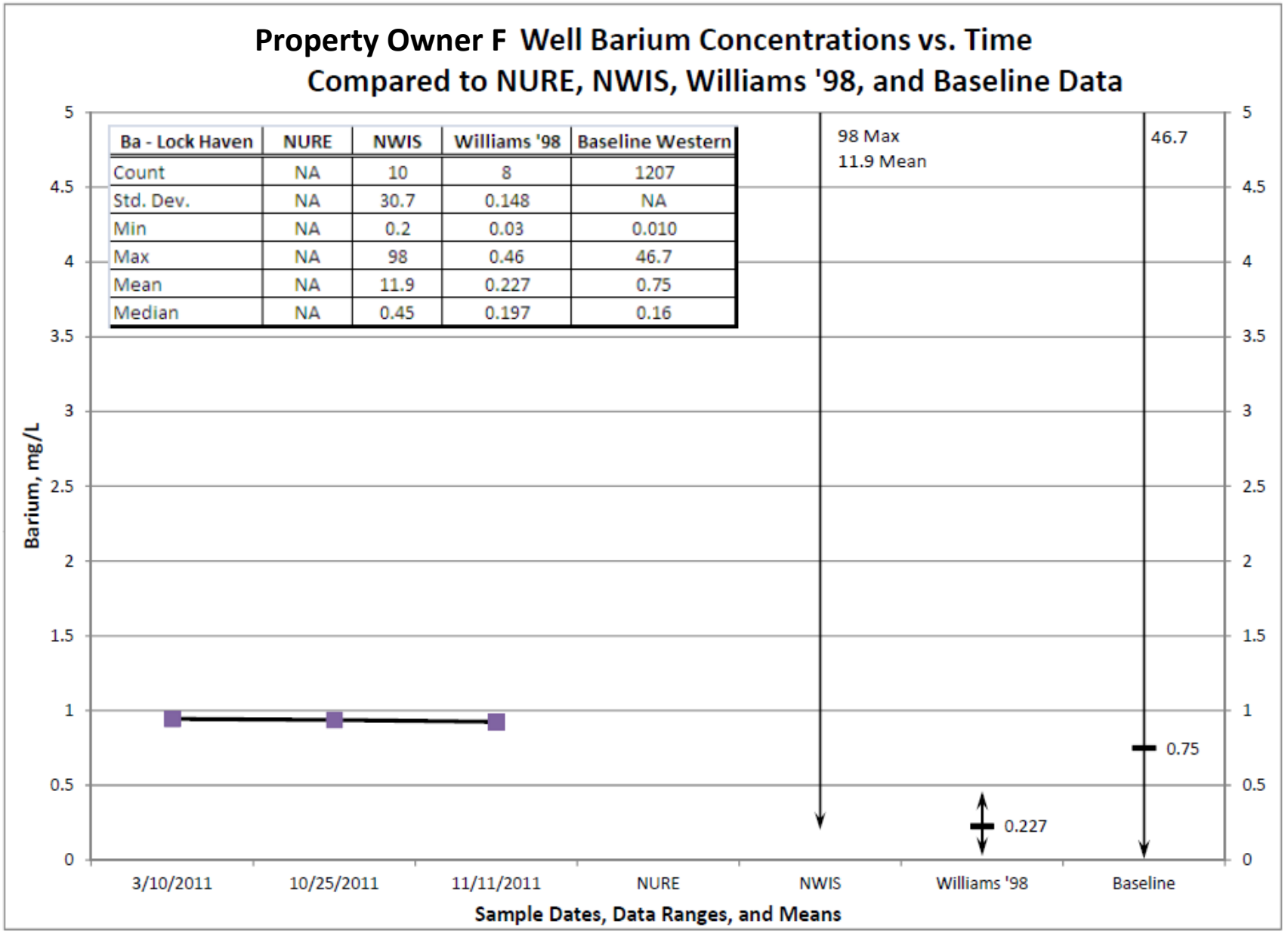
Property Owner E (185 ft.) Well Sodium Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

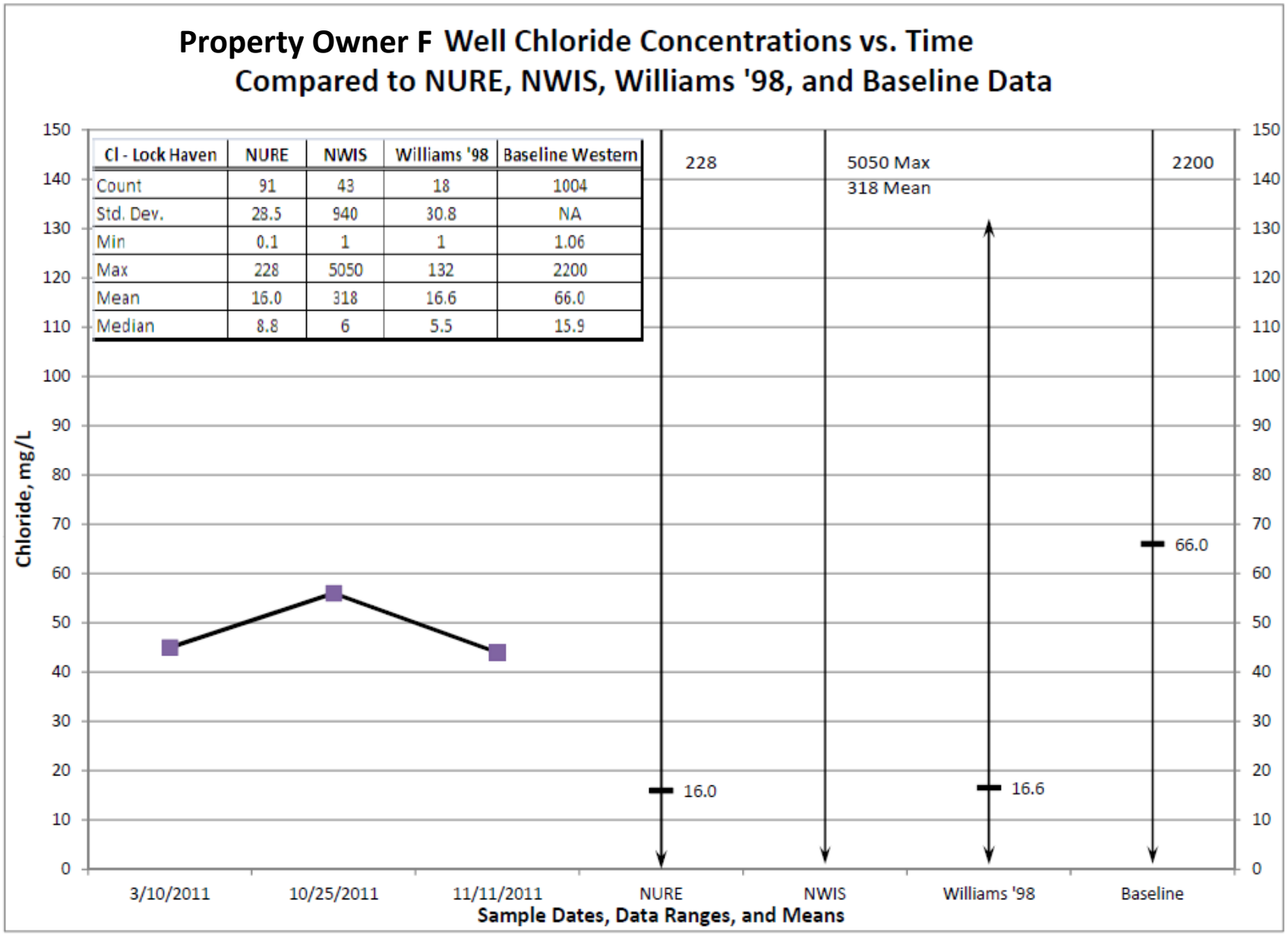
Na -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	51	17	10	1958
Std. Dev.	20.9	197	47.4	NA
Min	2.77	4	5	1
Max	145	829	132	1610
Mean	14.0	85.1	42.0	33.1
Median	8.58	23	18.5	14

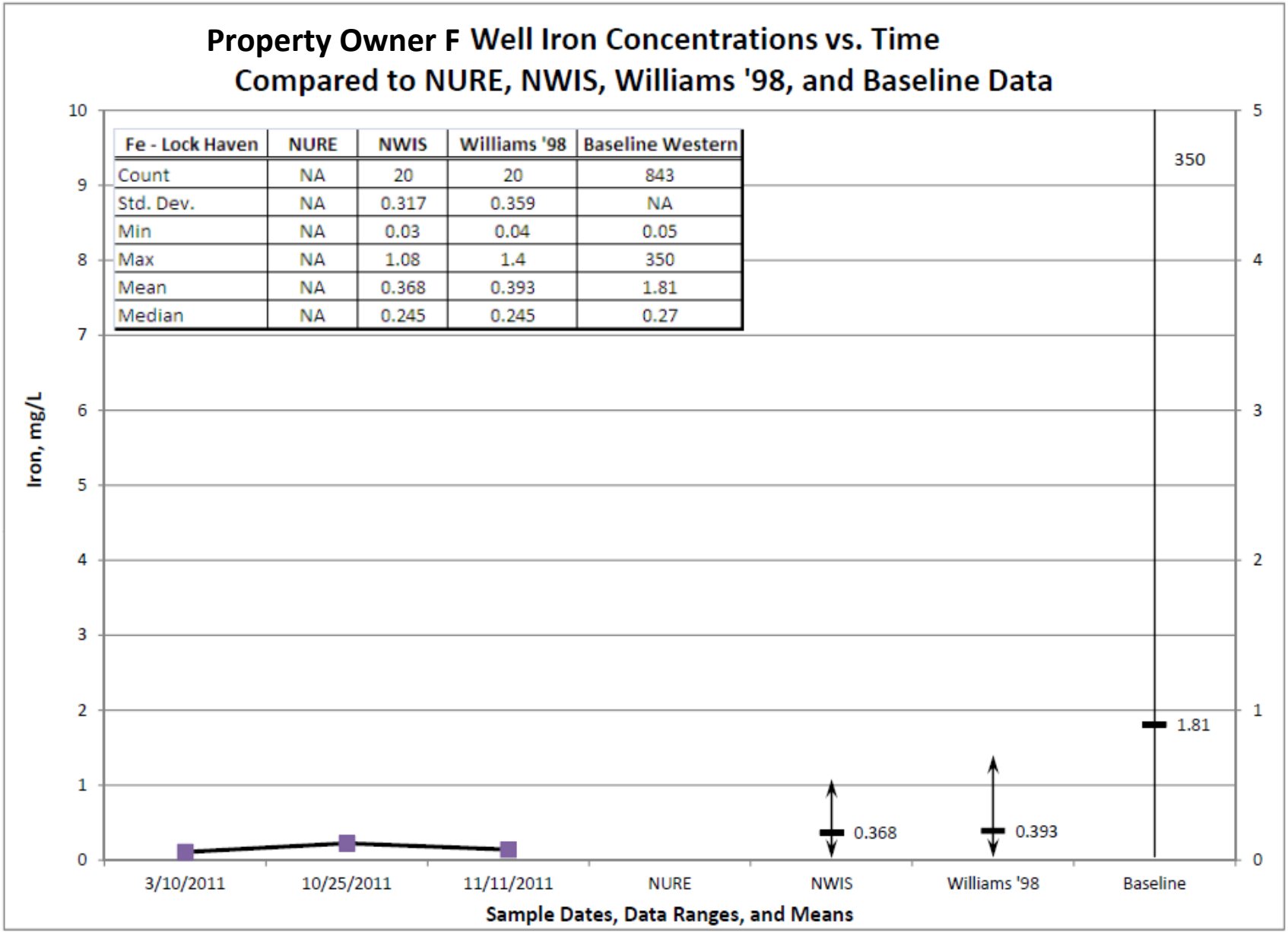



Property Owner_E (185 ft.) Well TDS Concentrations vs. Time
Compared to NURE, NWIS, Williams '98, and Baseline Data
TDS -Catskill | NURE | NWIS | Williams '98 | Baseline Central
Count | NA | 35 | 10 | 1961
Std. Dev. | NA | 661 | 177 | NA
Min | NA | 76 | 100 | 17
Max | NA | 4050 | 680 | 5410
Mean | NA | 362 | 263 | 223
Median | NA | 212 | 208 | 195
4050
5410
362
263
223
Baseline
TDS, mg/L
1000
900
800
700
600
500
400
300
200
100
0
4/1/2010
8/12/2010
1/8/2011
11/4/2011
NURE
NWIS
Williams '98
Baseline
Sample Dates, Data Ranges, and Means

APPENDIX D-7
TIME PLOTS
PROPERTY OWNER F

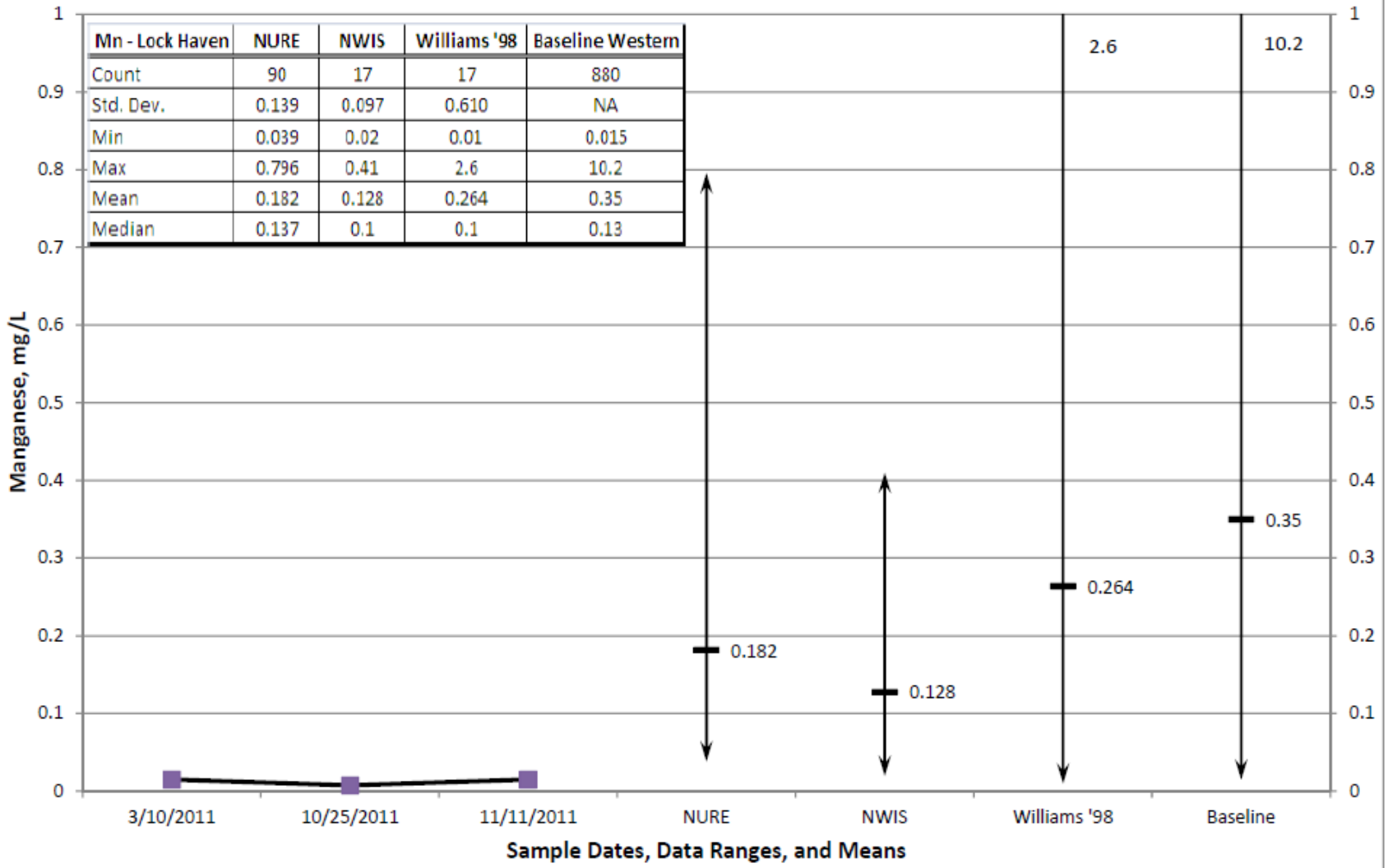

Property Owner F Well Barium Concentrations vs. Time
Compared to NURE, NWIS, Williams '98, and Baseline Data
Ba - Lock Haven | NURE | NWIS | Williams '98 | Baseline Western
Count | NA | 10 | 8 | 1207
Std. Dev. | NA | 30.7 | 0.148 | NA
Min | NA | 0.2 | 0.03 | 0.010
Max | NA | 98 | 0.46 | 46.7
Mean | NA | 11.9 | 0.227 | 0.75
Median | NA | 0.45 | 0.197 | 0.16
98 Max
11.9 Mean
46.7
0.75
0.227
Barium, mg/L
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
3/10/2011
10/25/2011
11/11/2011
NURE
NWIS
Williams '98
Baseline
Sample Dates, Data Ranges, and Means


Property Owner F Well Chloride Concentrations vs. Time
Compared to NURE, NWIS, Williams '98, and Baseline Data
Cl - Lock Haven | NURE | NWIS | Williams '98 | Baseline Western
Count | 91 | 43 | 18 | 1004
Std. Dev. | 28.5 | 940 | 30.8 | NA
Min | 0.1 | 1 | 1 | 1.06
Max | 228 | 5050 | 132 | 2200
Mean | 16.0 | 318 | 16.6 | 66.0
Median | 8.8 | 6 | 5.5 | 15.9
228
5050 Max
318 Mean
2200
66.0
16.0
16.6
Chloride, mg/L
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
3/10/2011
10/25/2011
11/11/2011
NURE
NWIS
Williams '98
Baseline
Sample Dates, Data Ranges, and Means


Property Owner F Well Iron Concentrations vs. Time
Compared to NURE, NWIS, Williams '98, and Baseline Data
Fe - Lock Haven | NURE | NWIS | Williams '98 | Baseline Western
Count | NA | 20 | 20 | 843
Std. Dev. | NA | 0.317 | 0.359 | NA
Min | NA | 0.03 | 0.04 | 0.05
Max | NA | 1.08 | 1.4 | 350
Mean | NA | 0.368 | 0.393 | 1.81
Median | NA | 0.245 | 0.245 | 0.27
Iron, mg/L
10
9
8
7
6
5
4
3
2
1
0
5
4
3
2
1
0
350
1.81
0.368
0.393
3/10/2011
10/25/2011
11/11/2011
NURE
NWIS
Williams '98
Baseline
Sample Dates, Data Ranges, and Means

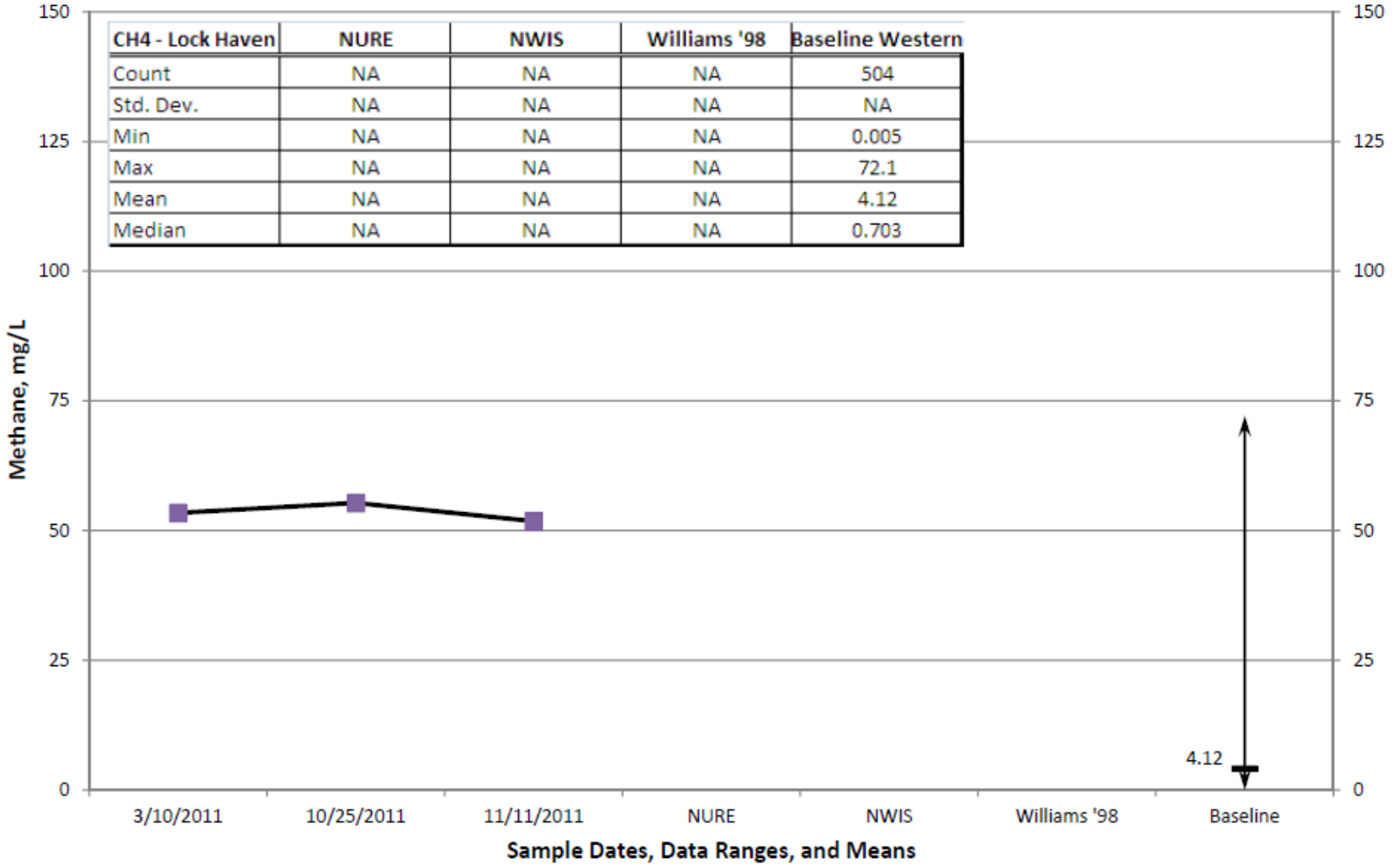
Property Owner F Well Manganese Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

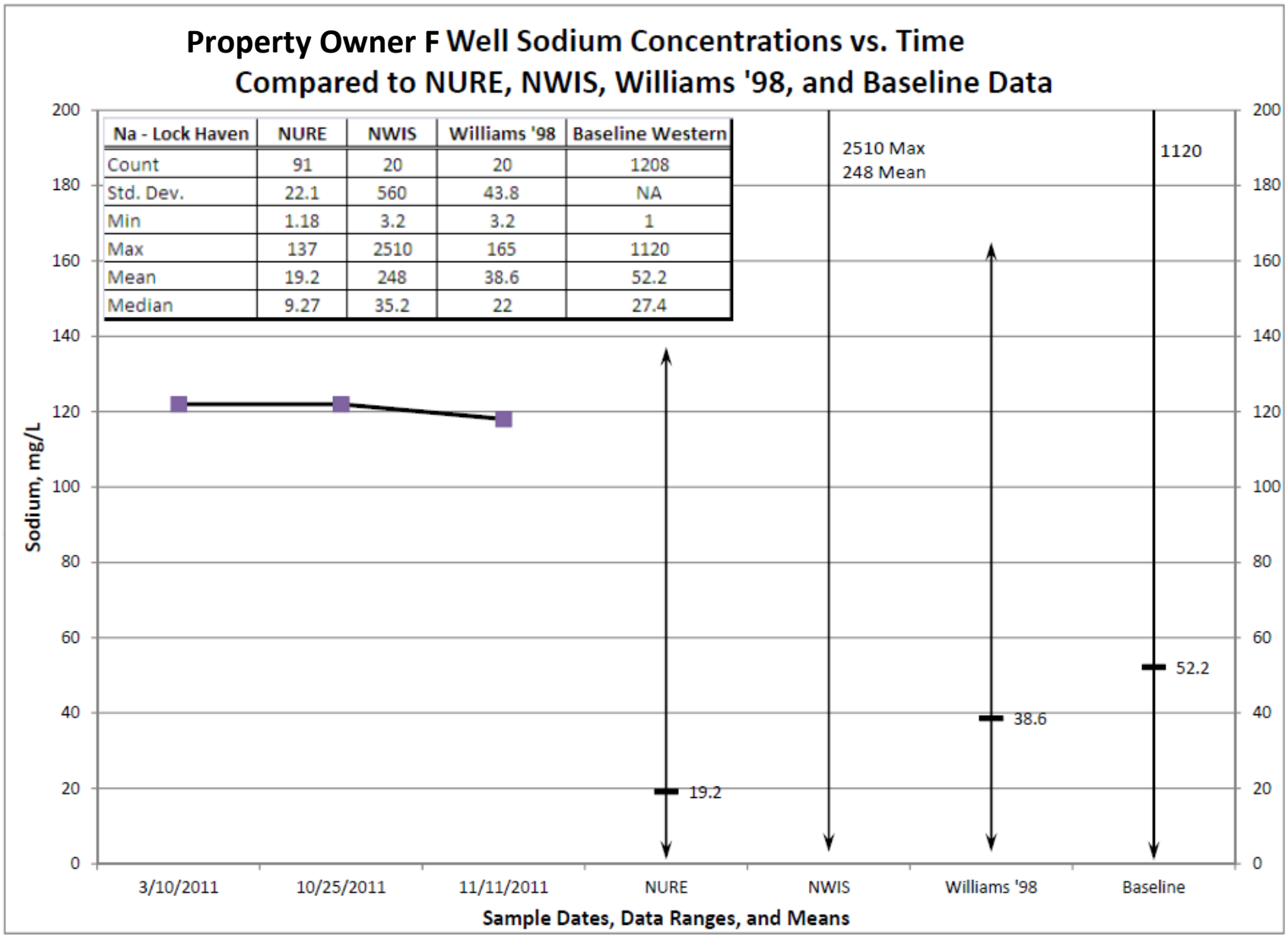
Mn - Lock Haven	NURE	NWIS	Williams '98	Baseline Western
Count	90	17	17	880
Std. Dev.	0.139	0.097	0.610	NA
Min	0.039	0.02	0.01	0.015
Max	0.796	0.41	2.6	10.2
Mean	0.182	0.128	0.264	0.35
Median	0.137	0.1	0.1	0.13

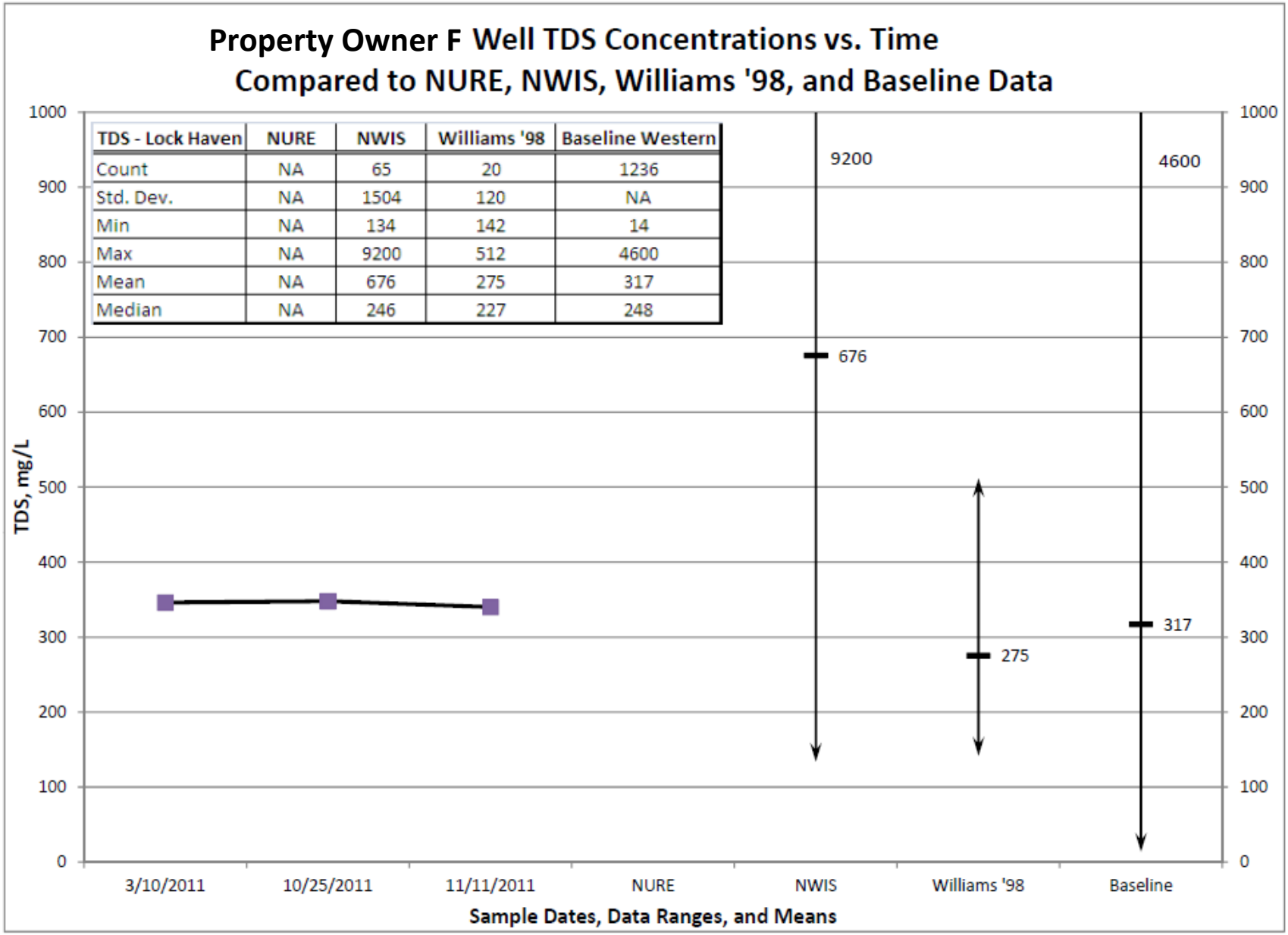


Property Owner F Well Methane Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

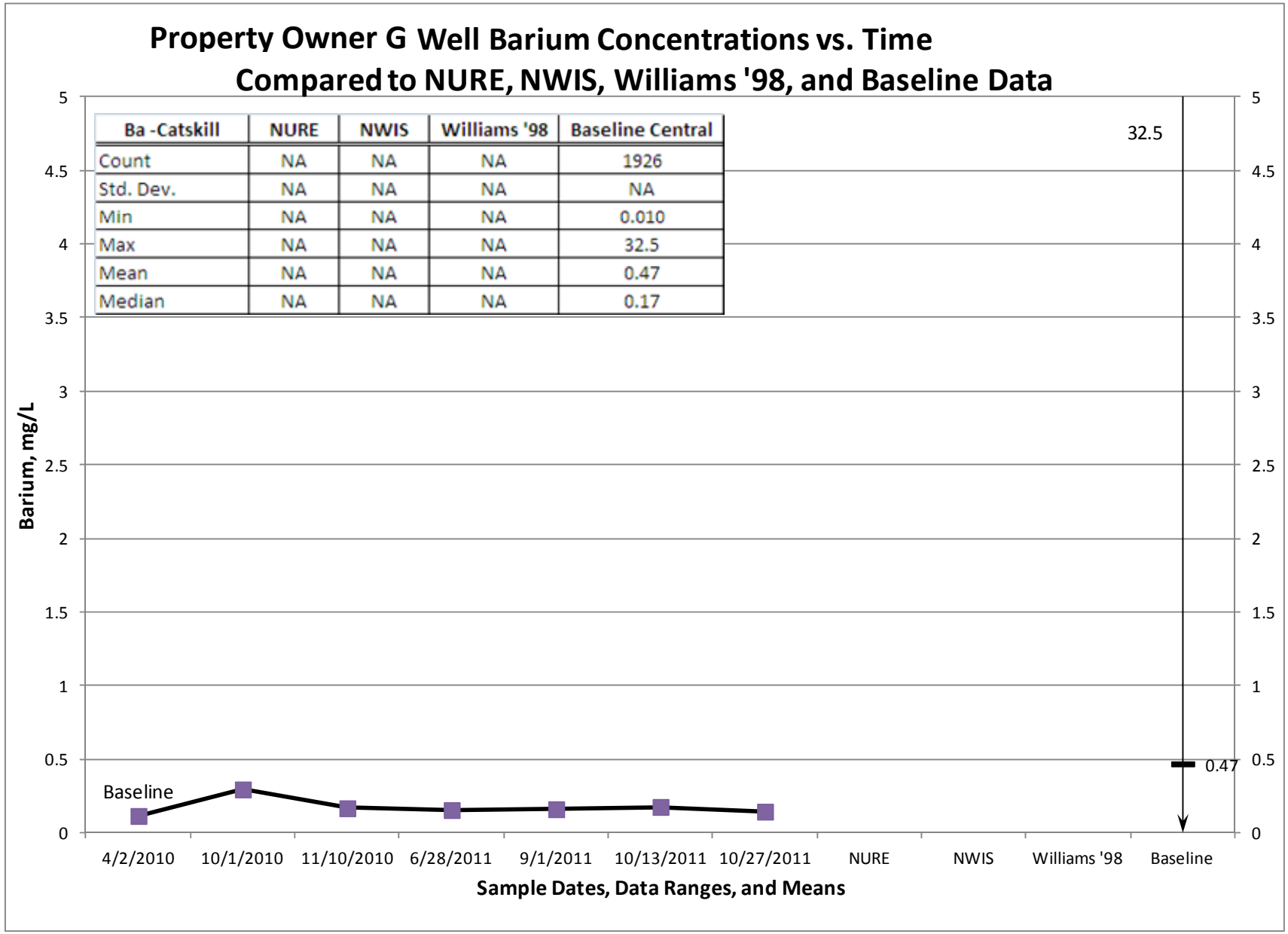
CH4 - Lock Haven	NURE	NWIS	Williams '98	Baseline Western
Count	NA	NA	NA	504
Std. Dev.	NA	NA	NA	NA
Min	NA	NA	NA	0.005
Max	NA	NA	NA	72.1
Mean	NA	NA	NA	4.12
Median	NA	NA	NA	0.703




Property Owner F Well Sodium Concentrations vs. Time
Compared to NURE, NWIS, Williams '98, and Baseline Data
Na - Lock Haven | NURE | NWIS | Williams '98 | Baseline Western
Count | 91 | 20 | 20 | 1208
Std. Dev. | 22.1 | 560 | 43.8 | NA
Min | 1.18 | 3.2 | 3.2 | 1
Max | 137 | 2510 | 165 | 1120
Mean | 19.2 | 248 | 38.6 | 52.2
Median | 9.27 | 35.2 | 22 | 27.4
2510 Max
248 Mean
1120
19.2
38.6
52.2
Sodium, mg/L
0
20
40
60
80
100
120
140
160
180
200
3/10/2011
10/25/2011
11/11/2011
NURE
NWIS
Williams '98
Baseline
Sample Dates, Data Ranges, and Means

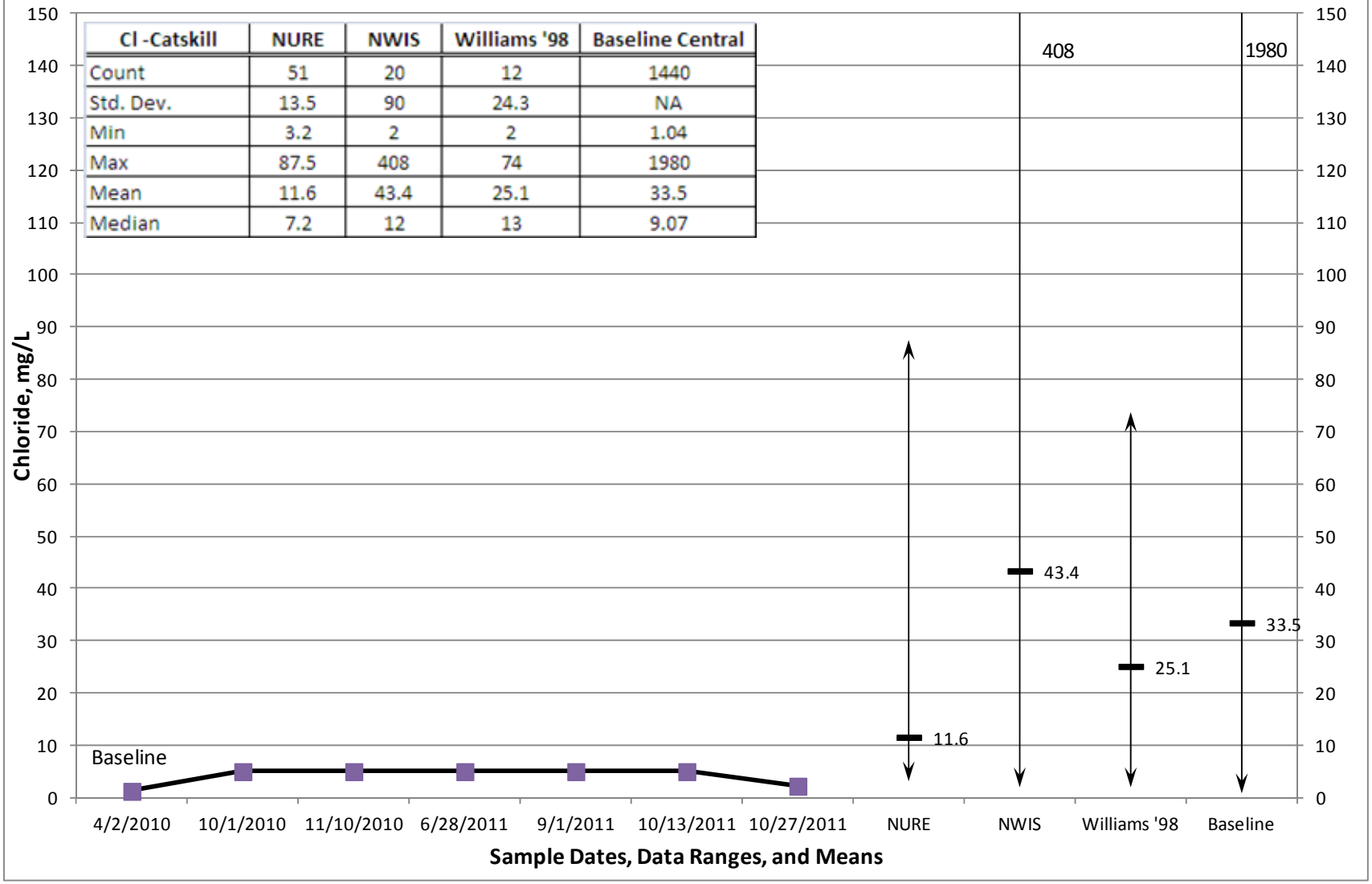

Property Owner F Well TDS Concentrations vs. Time
Compared to NURE, NWIS, Williams '98, and Baseline Data
TDS - Lock Haven | NURE | NWIS | Williams '98 | Baseline Western
Count | NA | 65 | 20 | 1236
Std. Dev. | NA | 1504 | 120 | NA
Min | NA | 134 | 142 | 14
Max | NA | 9200 | 512 | 4600
Mean | NA | 676 | 275 | 317
Median | NA | 246 | 227 | 248
9200
4600
676
317
275
TDS, mg/L
0
100
200
300
400
500
600
700
800
900
1000
3/10/2011
10/25/2011
11/11/2011
NURE
NWIS
Williams '98
Baseline
Sample Dates, Data Ranges, and Means

APPENDIX D-8
TIME PLOTS
PROPERTY OWNER G


Property Owner G Well Barium Concentrations vs. Time
Compared to NURE, NWIS, Williams '98, and Baseline Data
Ba -Catskill | NURE | NWIS | Williams '98 | Baseline Central
Count | NA | NA | NA | 1926
Std. Dev. | NA | NA | NA | NA
Min | NA | NA | NA | 0.010
Max | NA | NA | NA | 32.5
Mean | NA | NA | NA | 0.47
Median | NA | NA | NA | 0.17
32.5
0.47
Baseline
Barium, mg/L
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
4/2/2010
10/1/2010
11/10/2010
6/28/2011
9/1/2011
10/13/2011
10/27/2011
NURE
NWIS
Williams '98
Baseline
Sample Dates, Data Ranges, and Means

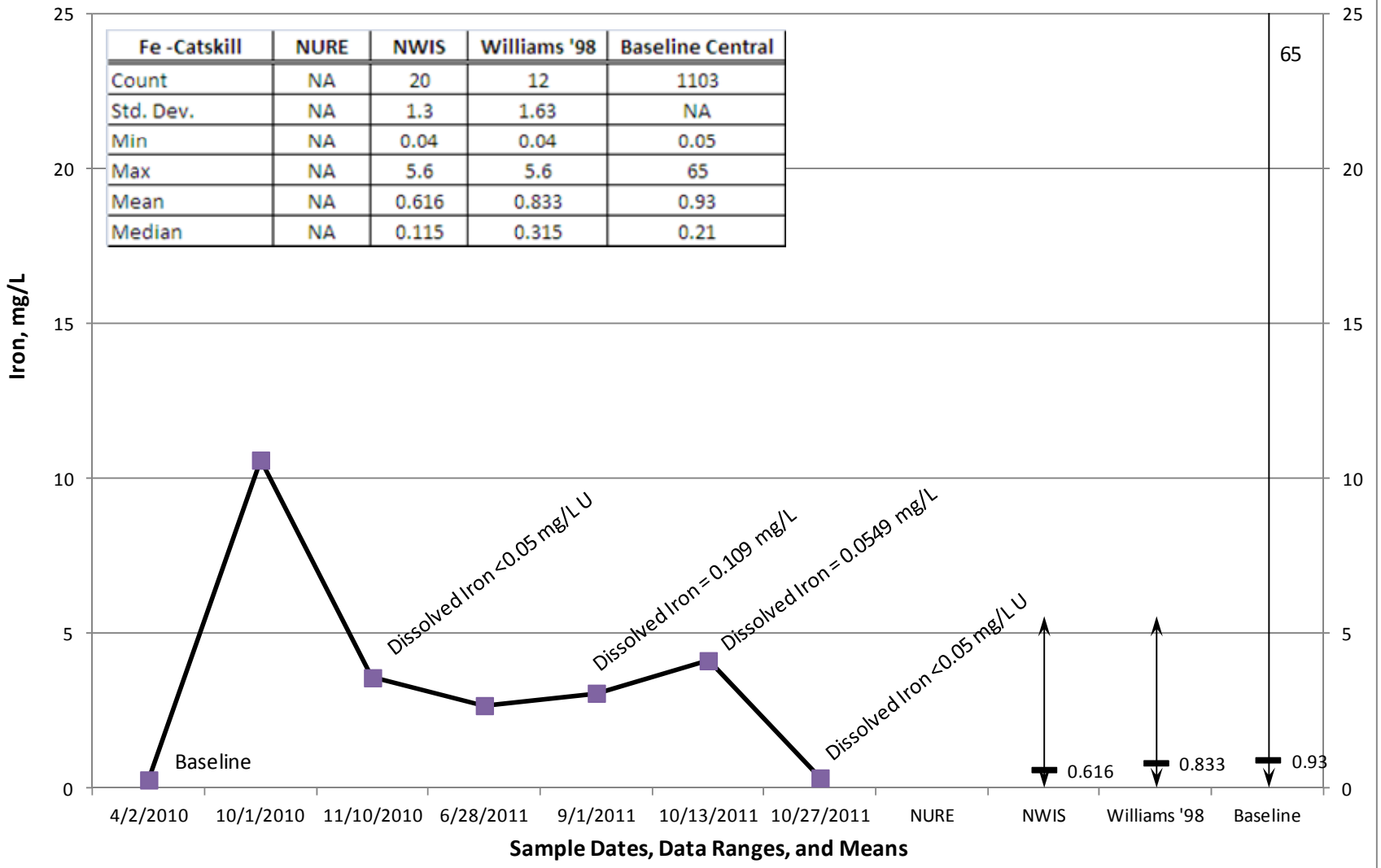
Property Owner G Chloride Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Cl -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	51	20	12	1440
Std. Dev.	13.5	90	24.3	NA
Min	3.2	2	2	1.04
Max	87.5	408	74	1980
Mean	11.6	43.4	25.1	33.5
Median	7.2	12	13	9.07



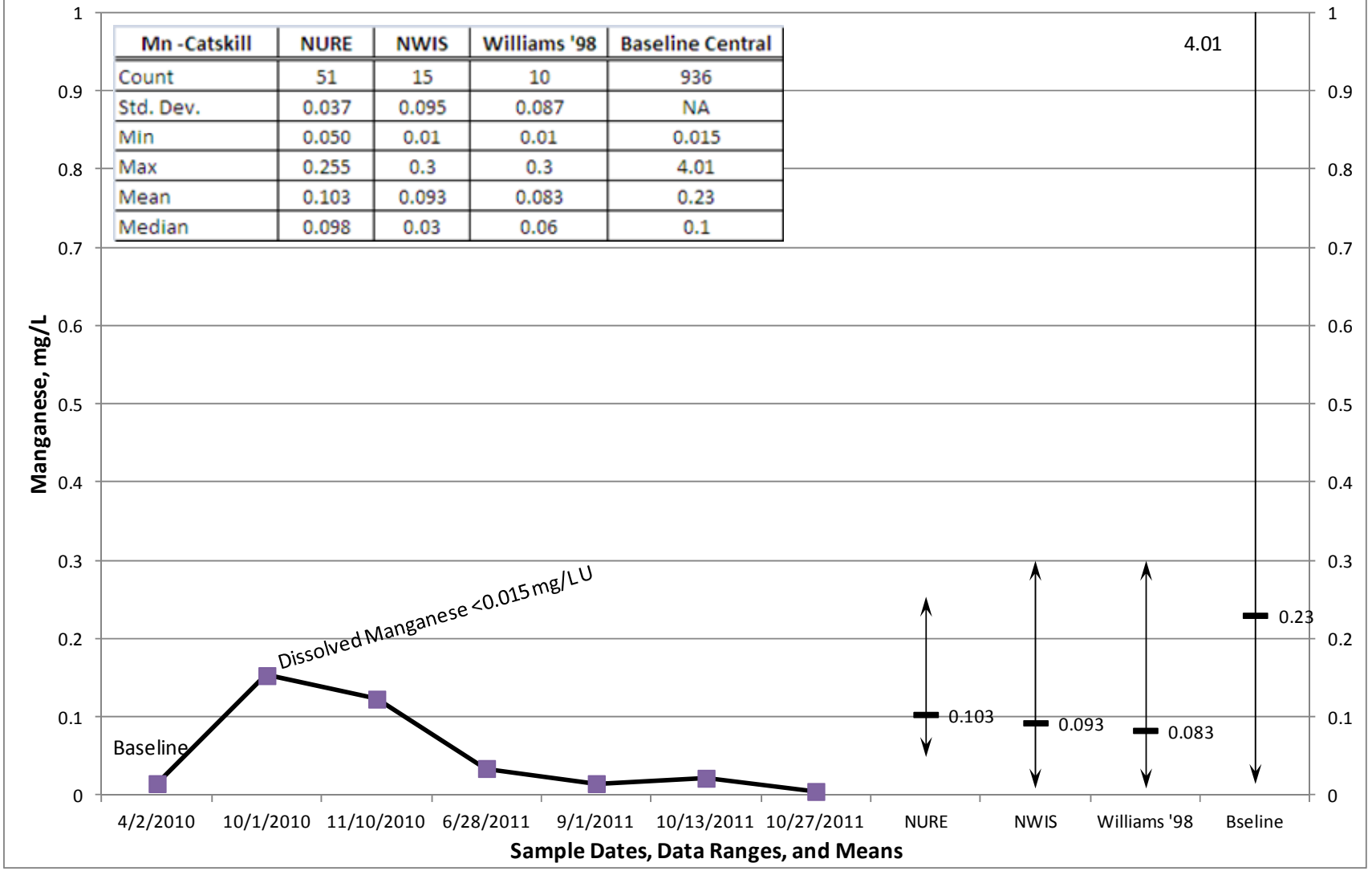
Property Owner G Well Iron Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Fe -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	NA	20	12	1103
Std. Dev.	NA	1.3	1.63	NA
Min	NA	0.04	0.04	0.05
Max	NA	5.6	5.6	65
Mean	NA	0.616	0.833	0.93
Median	NA	0.115	0.315	0.21



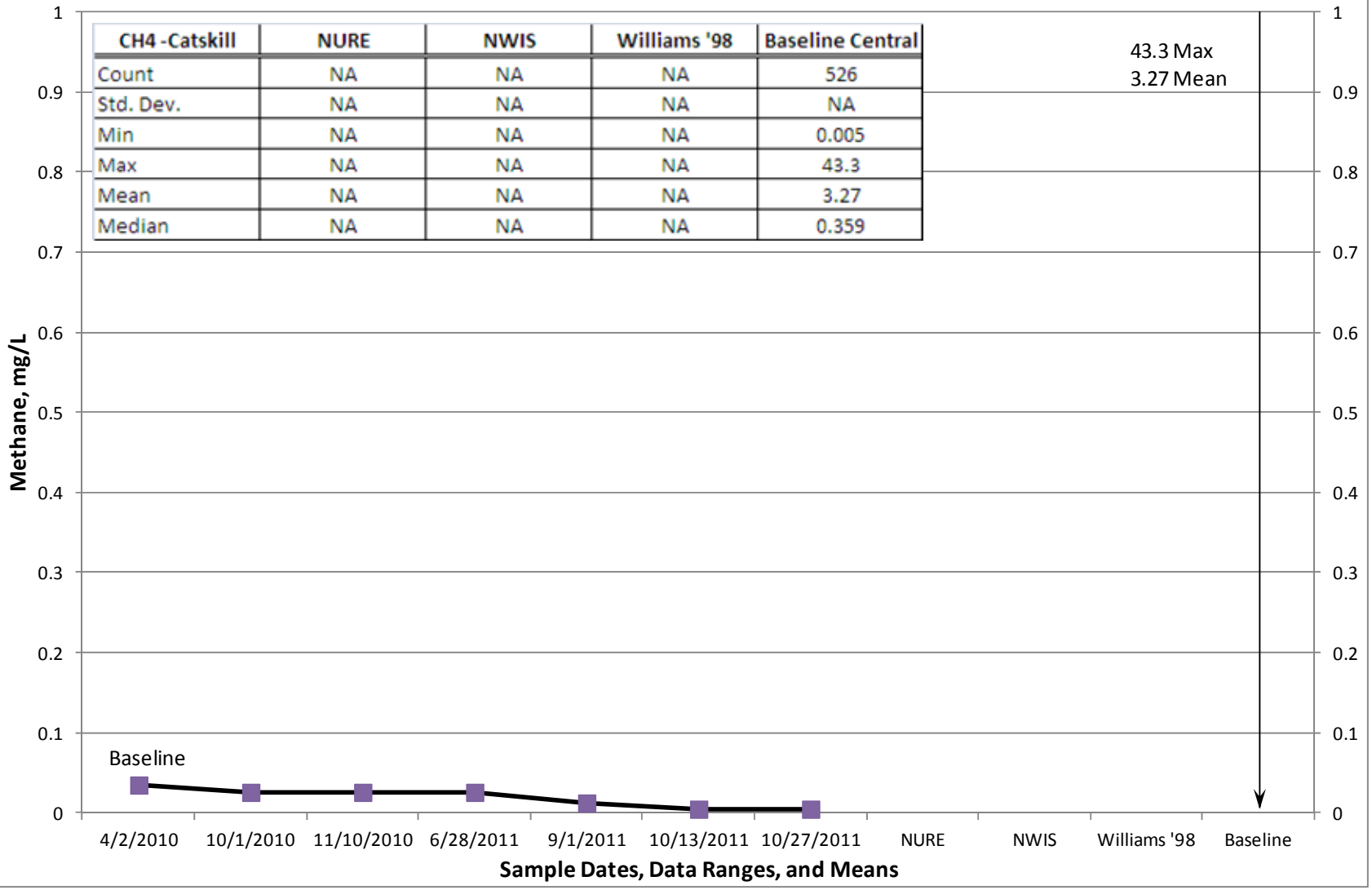
Property Owner G Well Manganese Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

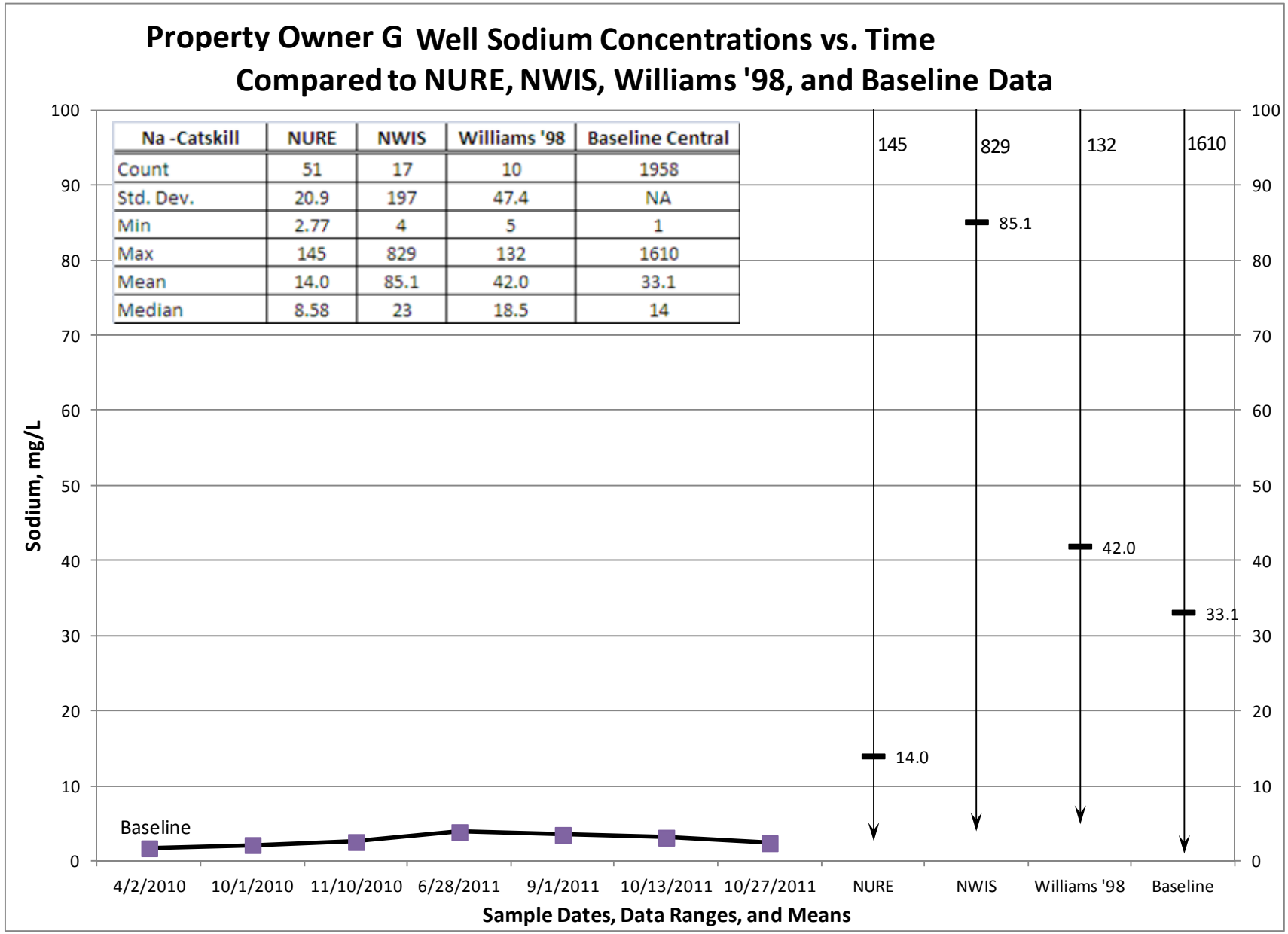
Mn -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	51	15	10	936
Std. Dev.	0.037	0.095	0.087	NA
Min	0.050	0.01	0.01	0.015
Max	0.255	0.3	0.3	4.01
Mean	0.103	0.093	0.083	0.23
Median	0.098	0.03	0.06	0.1

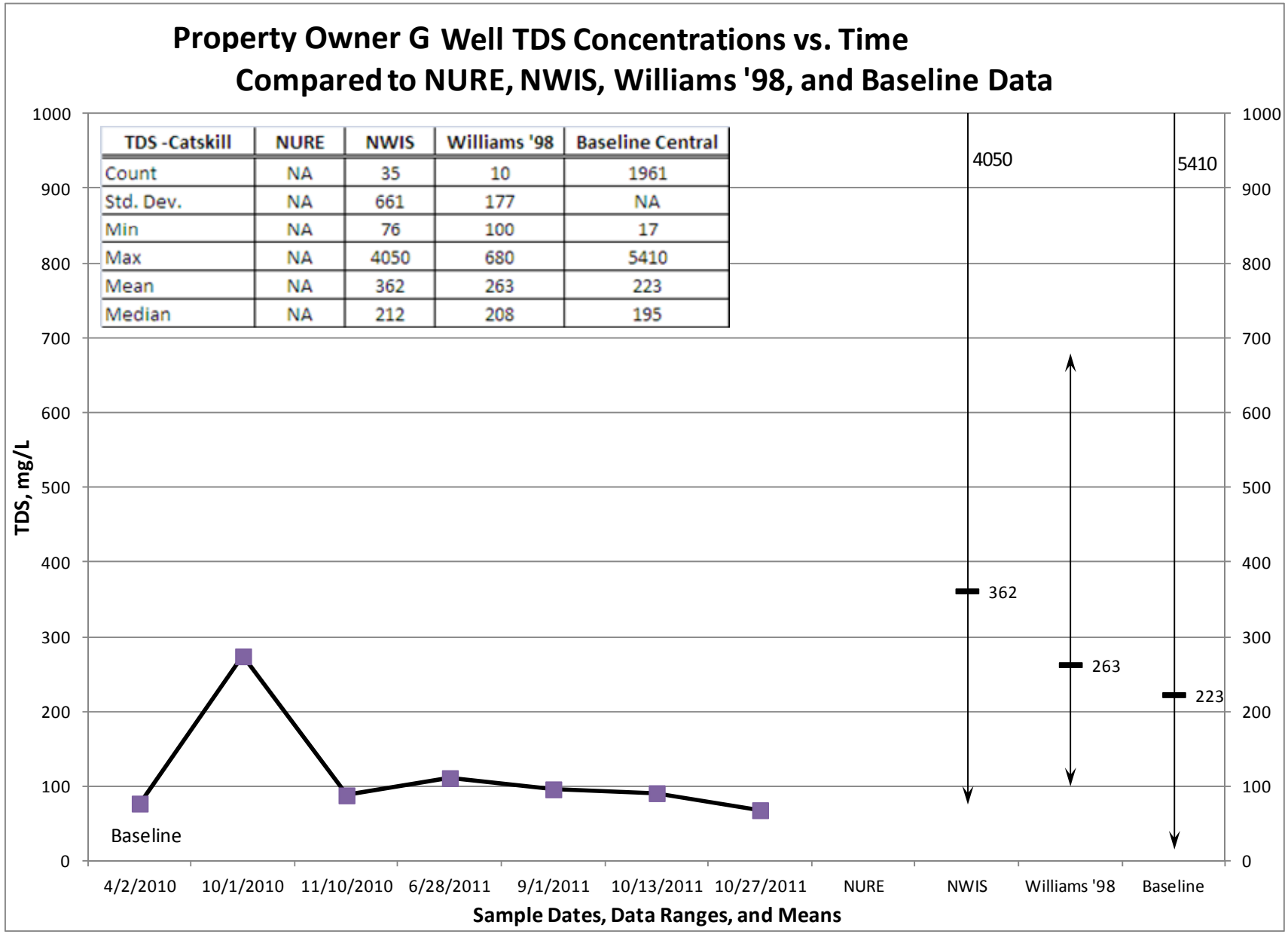


Property Owner G Well Methane Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

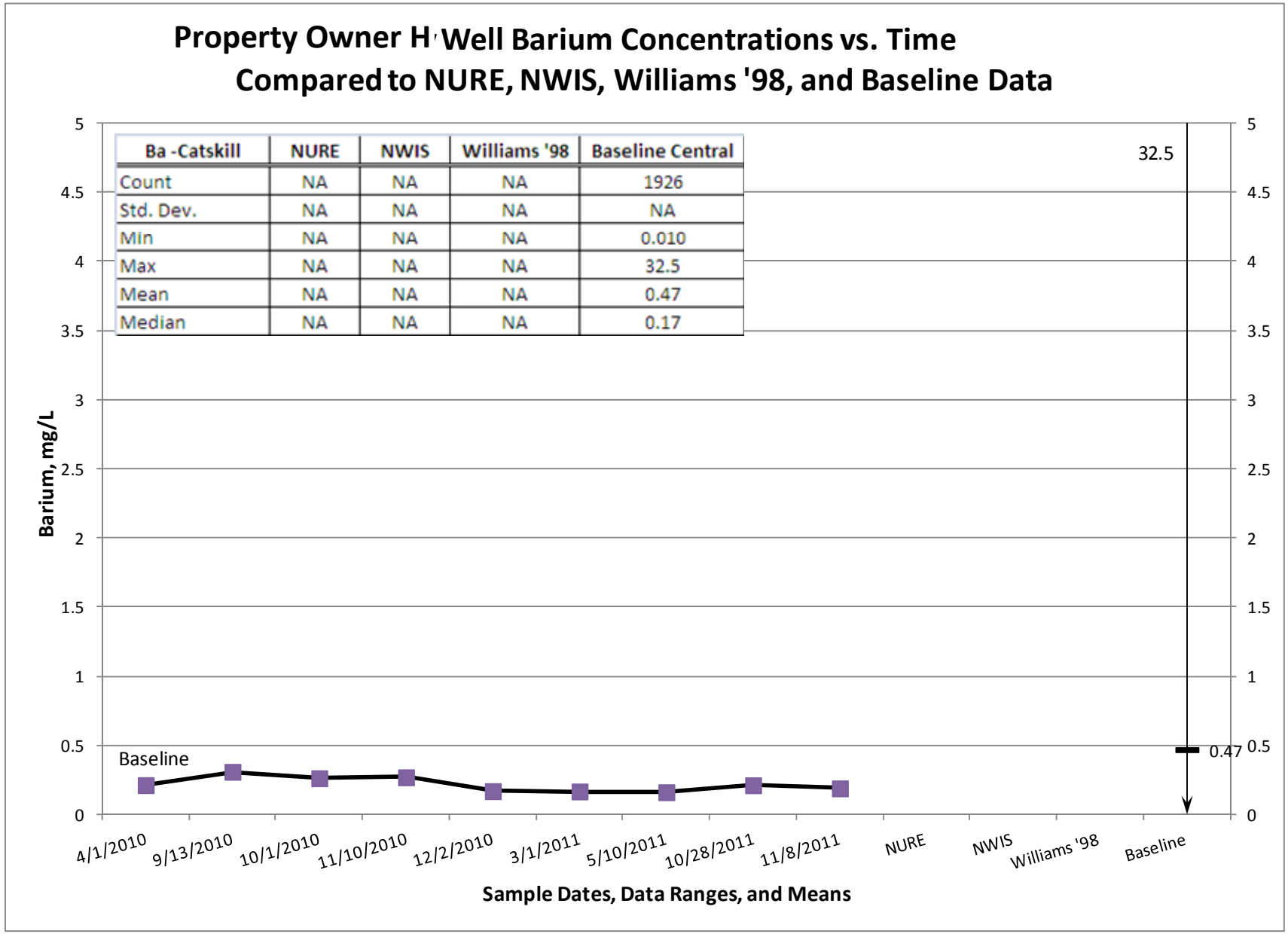
CH4 -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	NA	NA	NA	526
Std. Dev.	NA	NA	NA	NA
Min	NA	NA	NA	0.005
Max	NA	NA	NA	43.3
Mean	NA	NA	NA	3.27
Median	NA	NA	NA	0.359




Property Owner G Well Sodium Concentrations vs. Time
Compared to NURE, NWIS, Williams '98, and Baseline Data
Na -Catskill | NURE | NWIS | Williams '98 | Baseline Central
Count | 51 | 17 | 10 | 1958
Std. Dev. | 20.9 | 197 | 47.4 | NA
Min | 2.77 | 4 | 5 | 1
Max | 145 | 829 | 132 | 1610
Mean | 14.0 | 85.1 | 42.0 | 33.1
Median | 8.58 | 23 | 18.5 | 14
145
829
132
1610
85.1
42.0
33.1
14.0
Baseline
Sodium, mg/L
0
10
20
30
40
50
60
70
80
90
100
4/2/2010
10/1/2010
11/10/2010
6/28/2011
9/1/2011
10/13/2011
10/27/2011
NURE
NWIS
Williams '98
Baseline
Sample Dates, Data Ranges, and Means

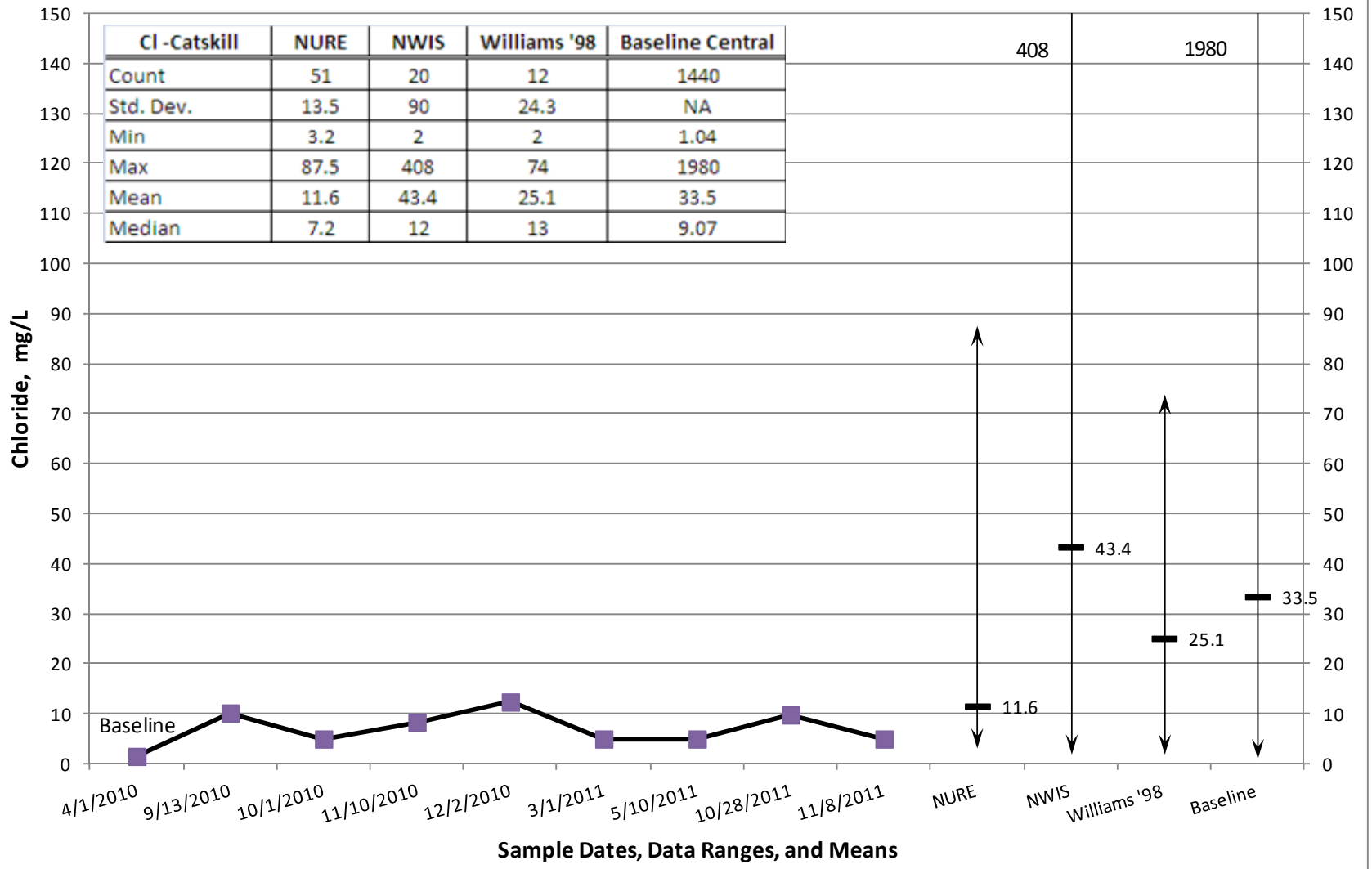

Property Owner G Well TDS Concentrations vs. Time
Compared to NURE, NWIS, Williams '98, and Baseline Data
TDS -Catskill | NURE | NWIS | Williams '98 | Baseline Central
Count | NA | 35 | 10 | 1961
Std. Dev. | NA | 661 | 177 | NA
Min | NA | 76 | 100 | 17
Max | NA | 4050 | 680 | 5410
Mean | NA | 362 | 263 | 223
Median | NA | 212 | 208 | 195
4050
5410
362
263
223
Baseline
TDS, mg/L
1000
900
800
700
600
500
400
300
200
100
0
4/2/2010
10/1/2010
11/10/2010
6/28/2011
9/1/2011
10/13/2011
10/27/2011
NURE
NWIS
Williams '98
Baseline
Sample Dates, Data Ranges, and Means

APPENDIX D-9
TIME PLOTS
PROPERTY OWNER H


Property Owner H Well Barium Concentrations vs. Time
Compared to NURE, NWIS, Williams '98, and Baseline Data
Ba -Catskill | NURE | NWIS | Williams '98 | Baseline Central
Count | NA | NA | NA | 1926
Std. Dev. | NA | NA | NA | NA
Min | NA | NA | NA | 0.010
Max | NA | NA | NA | 32.5
Mean | NA | NA | NA | 0.47
Median | NA | NA | NA | 0.17
32.5
0.47
Baseline
Barium, mg/L
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
4/1/2010
9/13/2010
10/1/2010
11/10/2010
12/2/2010
3/1/2011
5/10/2011
10/28/2011
11/8/2011
NURE
NWIS
Williams '98
Baseline
Sample Dates, Data Ranges, and Means

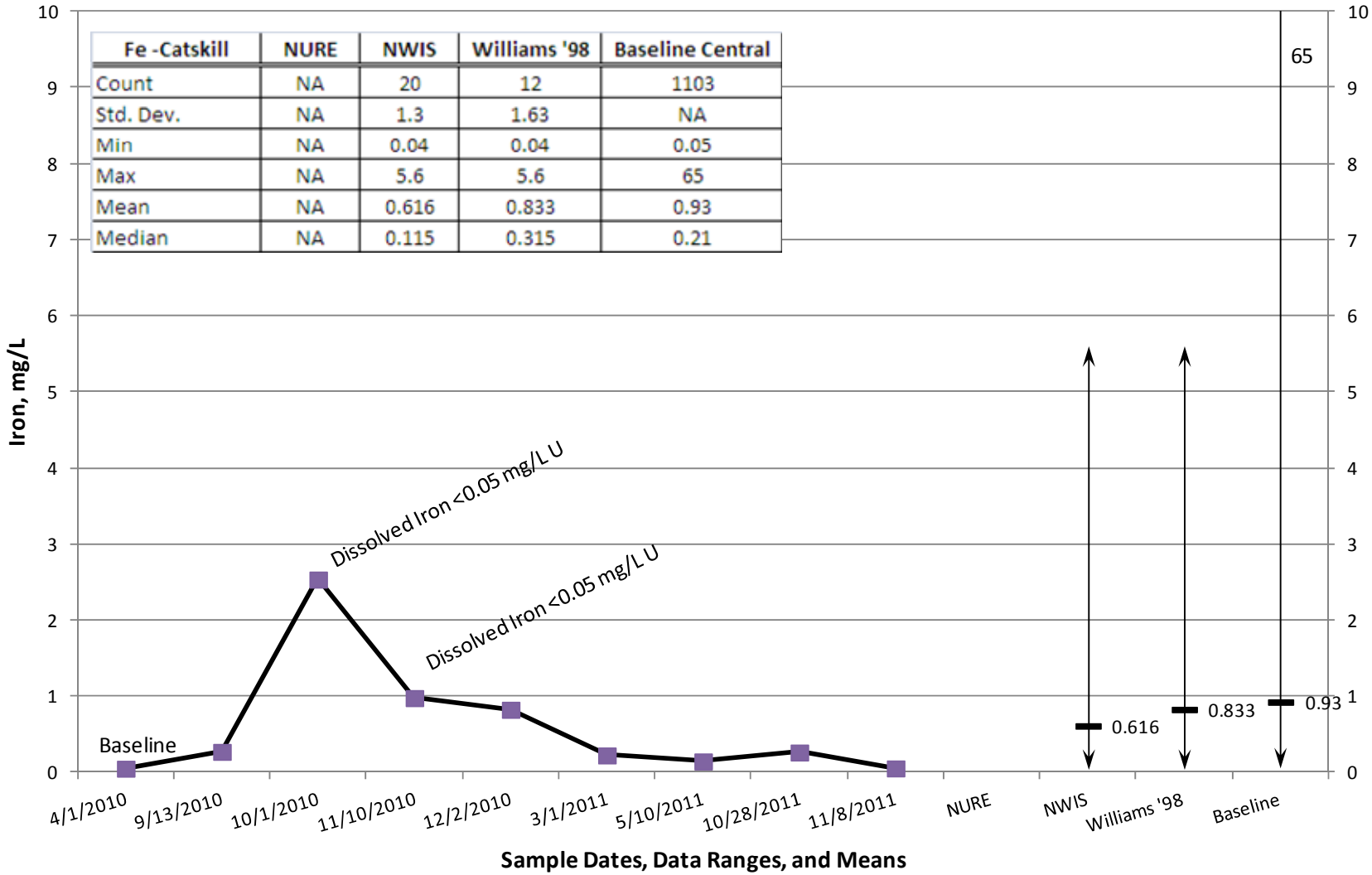
Property Owner H Well Chloride Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Cl -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	51	20	12	1440
Std. Dev.	13.5	90	24.3	NA
Min	3.2	2	2	1.04
Max	87.5	408	74	1980
Mean	11.6	43.4	25.1	33.5
Median	7.2	12	13	9.07



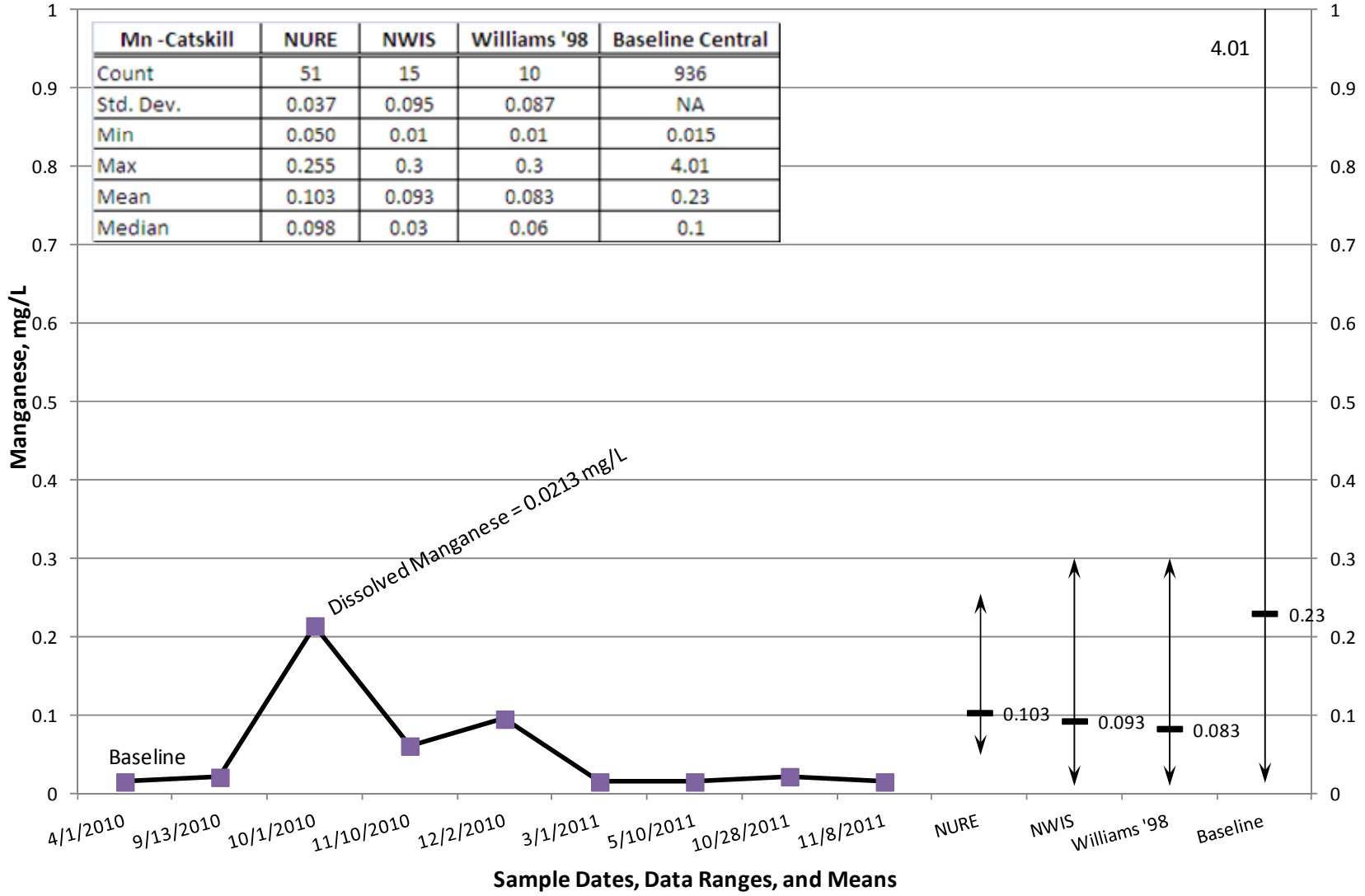
Property Owner H Well Iron Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

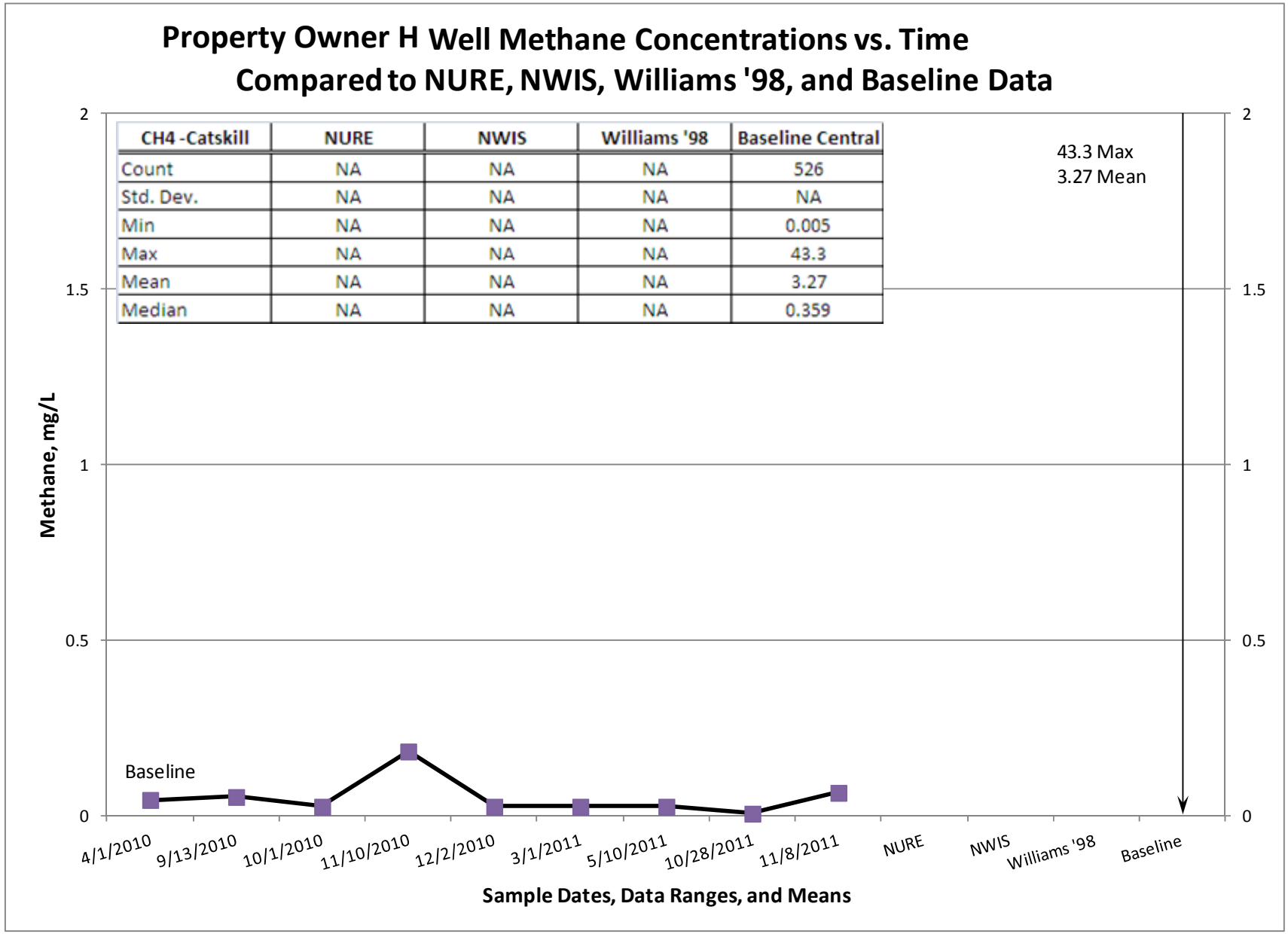
Fe -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	NA	20	12	1103
Std. Dev.	NA	1.3	1.63	NA
Min	NA	0.04	0.04	0.05
Max	NA	5.6	5.6	65
Mean	NA	0.616	0.833	0.93
Median	NA	0.115	0.315	0.21

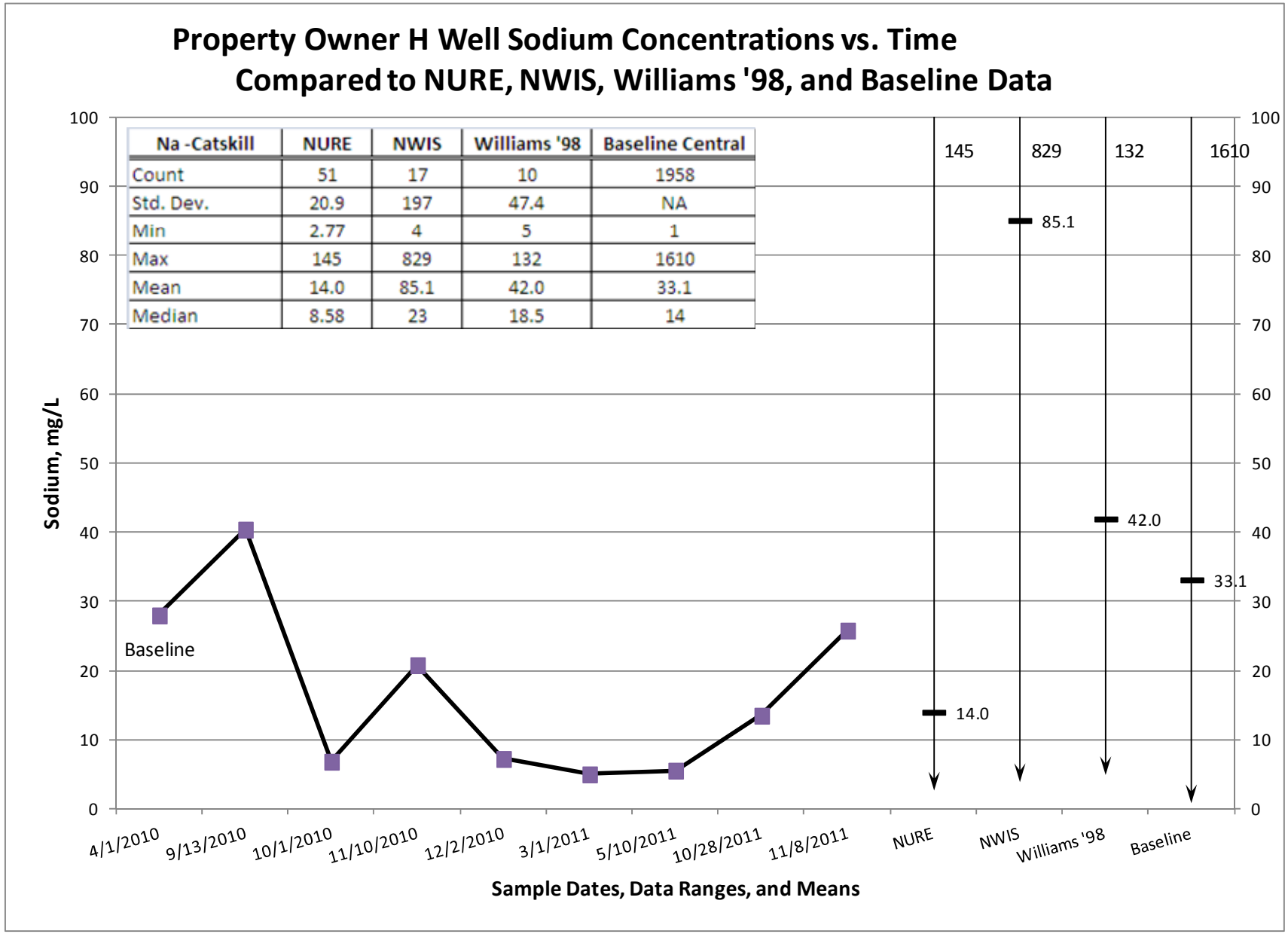


Property Owner H Well Manganese Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Mn -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	51	15	10	936
Std. Dev.	0.037	0.095	0.087	NA
Min	0.050	0.01	0.01	0.015
Max	0.255	0.3	0.3	4.01
Mean	0.103	0.093	0.083	0.23
Median	0.098	0.03	0.06	0.1

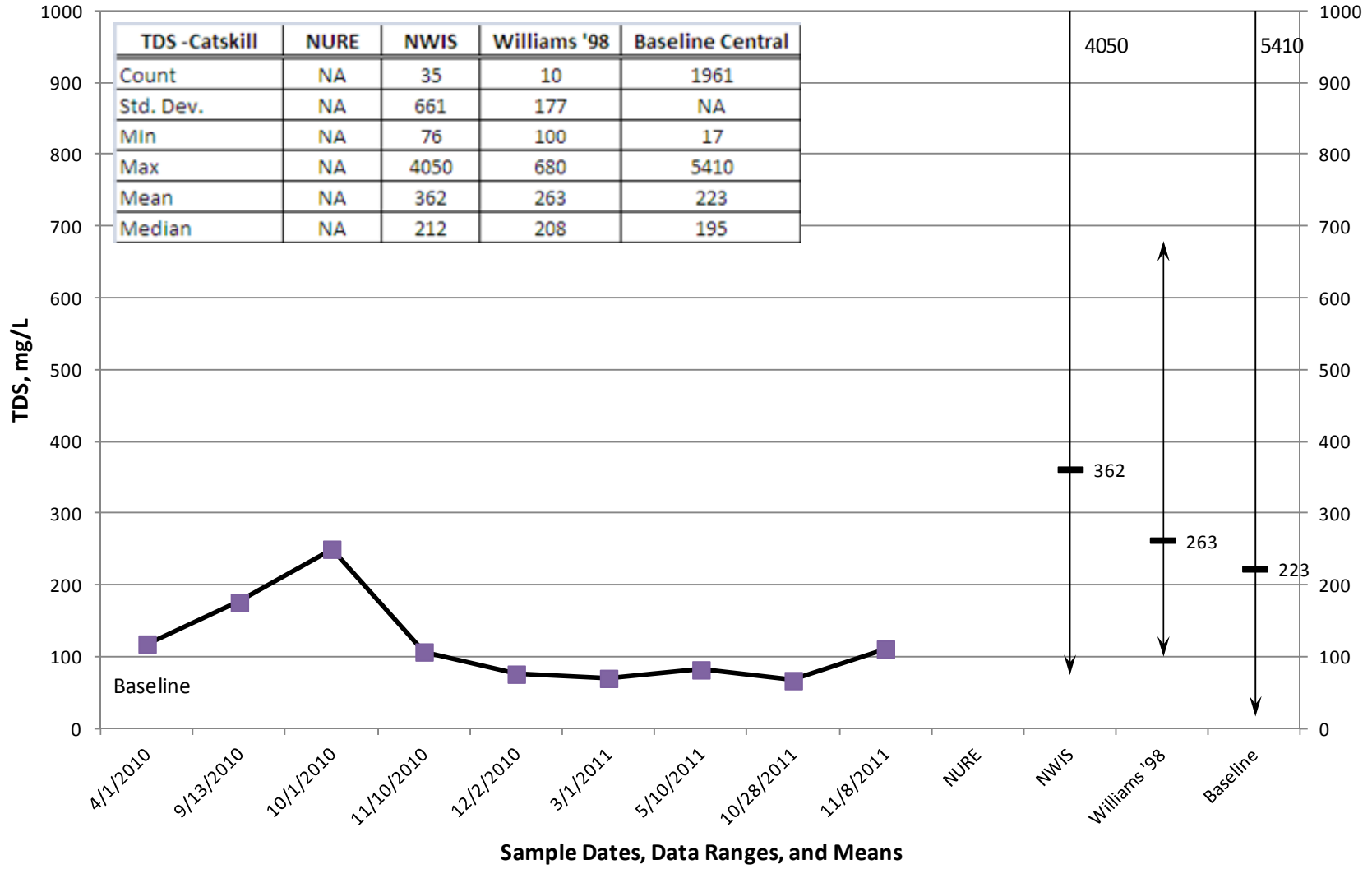



Property Owner H Well Methane Concentrations vs. Time
Compared to NURE, NWIS, Williams '98, and Baseline Data
CH4 -Catskill | NURE | NWIS | Williams '98 | Baseline Central
Count | NA | NA | NA | 526
Std. Dev. | NA | NA | NA | NA
Min | NA | NA | NA | 0.005
Max | NA | NA | NA | 43.3
Mean | NA | NA | NA | 3.27
Median | NA | NA | NA | 0.359
43.3 Max
3.27 Mean
Methane, mg/L
2
1.5
1
0.5
0
Baseline
4/1/2010
9/13/2010
10/1/2010
11/10/2010
12/2/2010
3/1/2011
5/10/2011
10/28/2011
11/8/2011
NURE
NWIS
Williams '98
Baseline
Sample Dates, Data Ranges, and Means

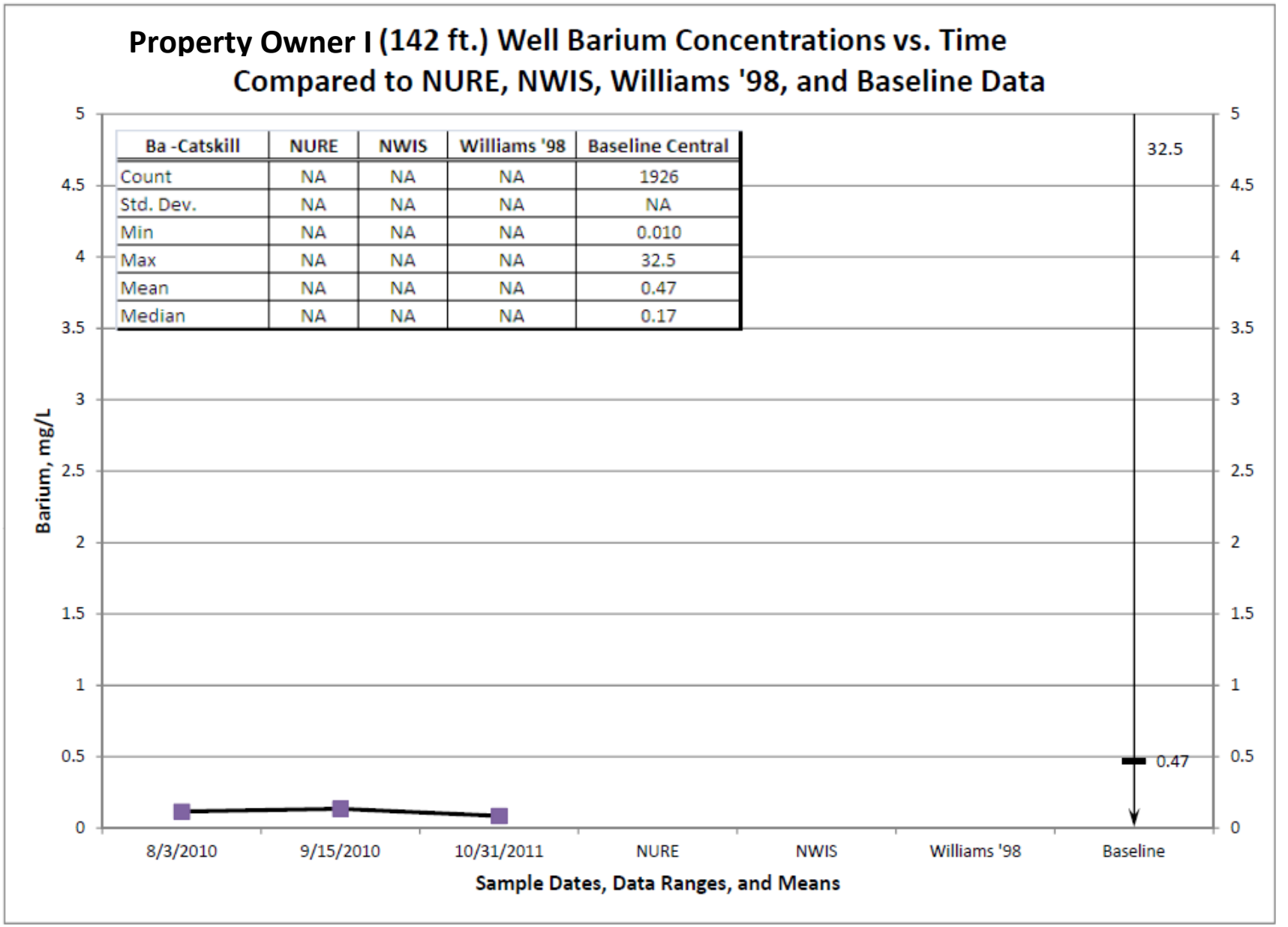

Property Owner H Well Sodium Concentrations vs. Time
Compared to NURE, NWIS, Williams '98, and Baseline Data
Na -Catskill | NURE | NWIS | Williams '98 | Baseline Central
Count | 51 | 17 | 10 | 1958
Std. Dev. | 20.9 | 197 | 47.4 | NA
Min | 2.77 | 4 | 5 | 1
Max | 145 | 829 | 132 | 1610
Mean | 14.0 | 85.1 | 42.0 | 33.1
Median | 8.58 | 23 | 18.5 | 14
Sodium, mg/L
Baseline
145
829
132
1610
85.1
42.0
33.1
14.0
4/1/2010
9/13/2010
10/1/2010
11/10/2010
12/2/2010
3/1/2011
5/10/2011
10/28/2011
11/8/2011
NURE
NWIS
Williams '98
Baseline
Sample Dates, Data Ranges, and Means

Property Owner H Well TDS Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

TDS -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	NA	35	10	1961
Std. Dev.	NA	661	177	NA
Min	NA	76	100	17
Max	NA	4050	680	5410
Mean	NA	362	263	223
Median	NA	212	208	195

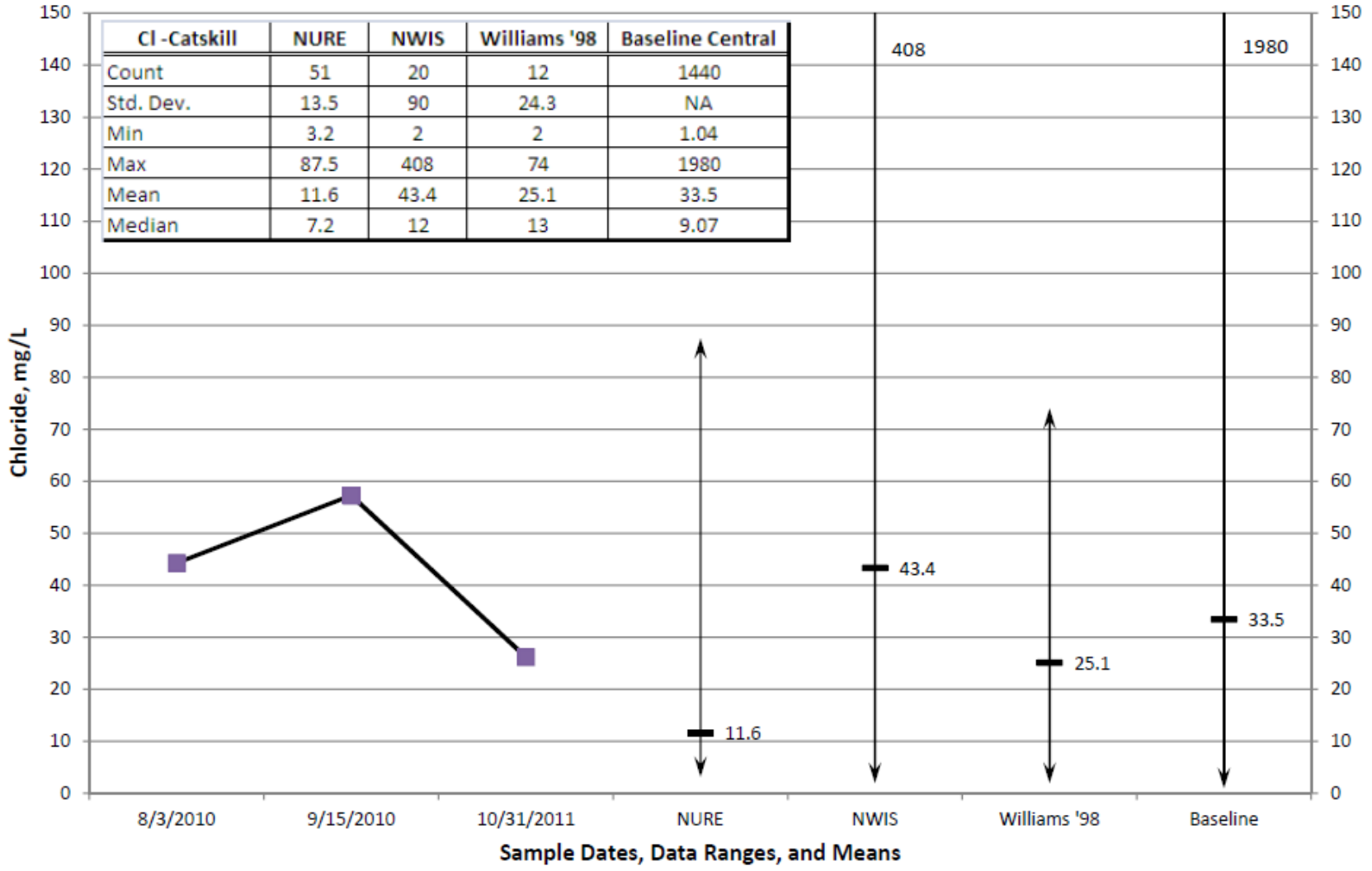


APPENDIX D-10
TIME PLOTS
PROPERTY OWNER I (142-FT)


Property Owner I (142 ft.) Well Barium Concentrations vs. Time
Compared to NURE, NWIS, Williams '98, and Baseline Data
Ba -Catskill | NURE | NWIS | Williams '98 | Baseline Central
Count | NA | NA | NA | 1926
Std. Dev. | NA | NA | NA | NA
Min | NA | NA | NA | 0.010
Max | NA | NA | NA | 32.5
Mean | NA | NA | NA | 0.47
Median | NA | NA | NA | 0.17
32.5
0.47
Barium, mg/L
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
8/3/2010
9/15/2010
10/31/2011
NURE
NWIS
Williams '98
Baseline
Sample Dates, Data Ranges, and Means

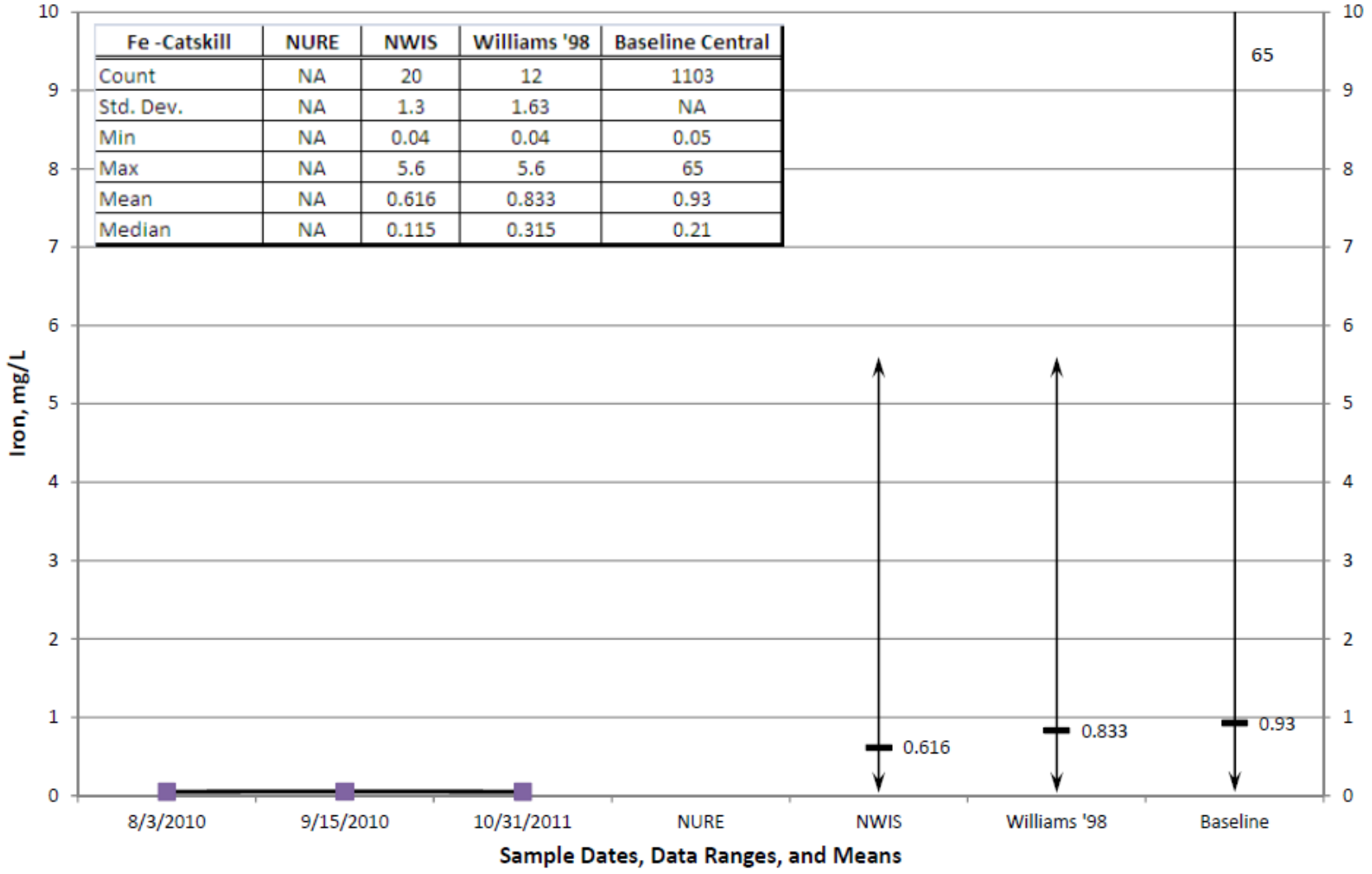
Property Owner I (142 ft.) Well Chloride Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

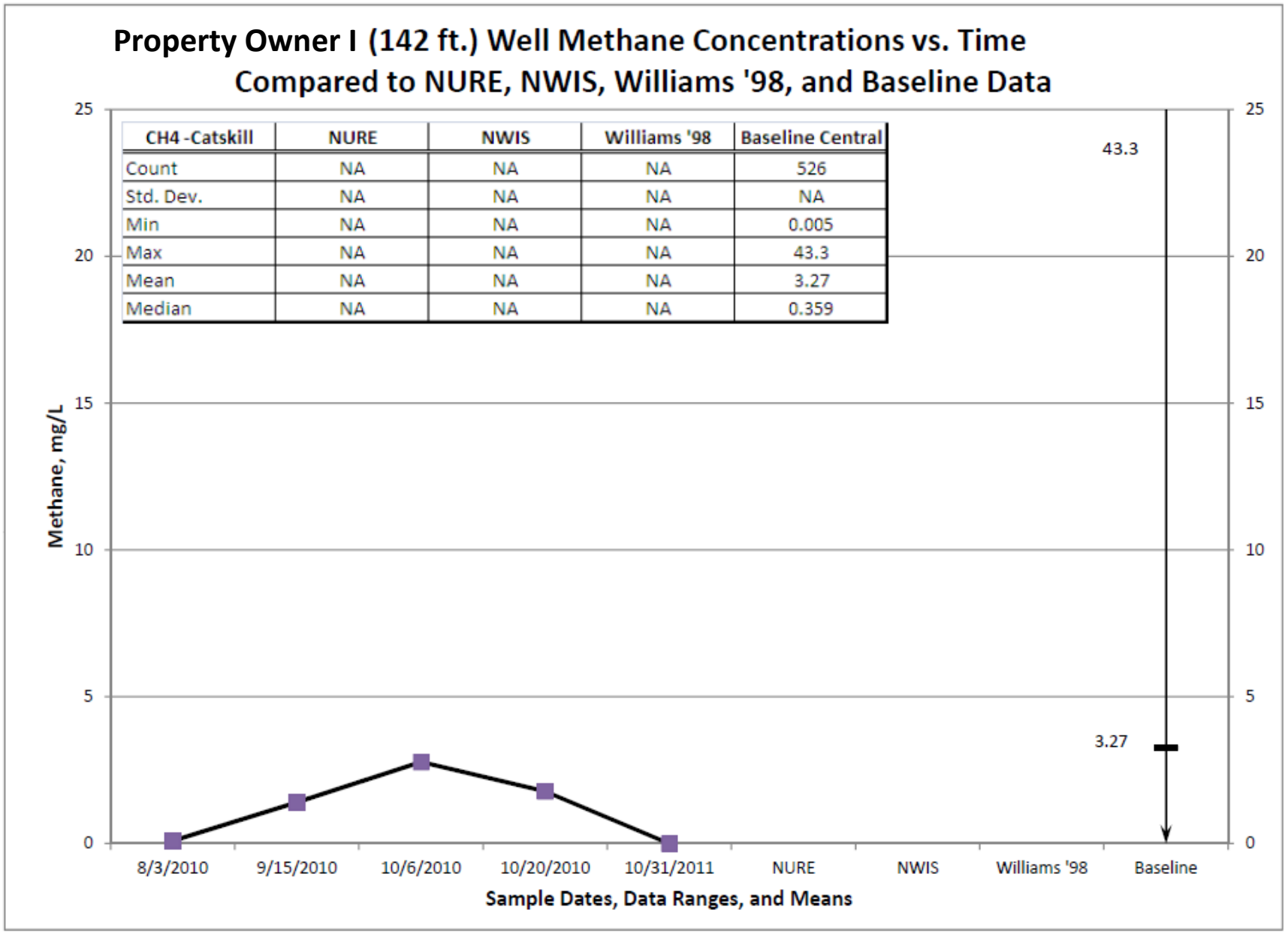
Cl -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	51	20	12	1440
Std. Dev.	13.5	90	24.3	NA
Min	3.2	2	2	1.04
Max	87.5	408	74	1980
Mean	11.6	43.4	25.1	33.5
Median	7.2	12	13	9.07

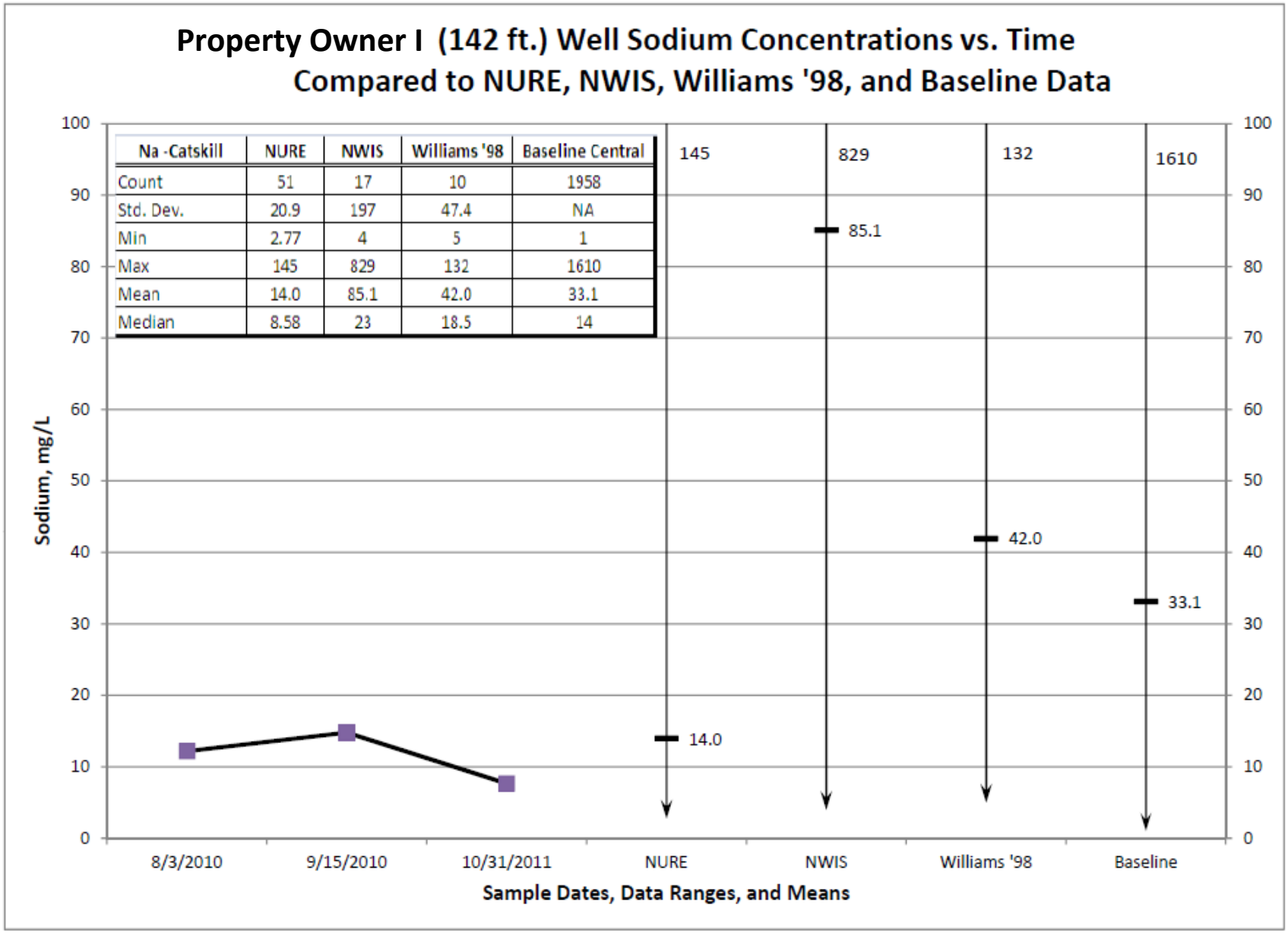


Property Owner I (142 ft.) Well Iron Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Fe -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	NA	20	12	1103
Std. Dev.	NA	1.3	1.63	NA
Min	NA	0.04	0.04	0.05
Max	NA	5.6	5.6	65
Mean	NA	0.616	0.833	0.93
Median	NA	0.115	0.315	0.21

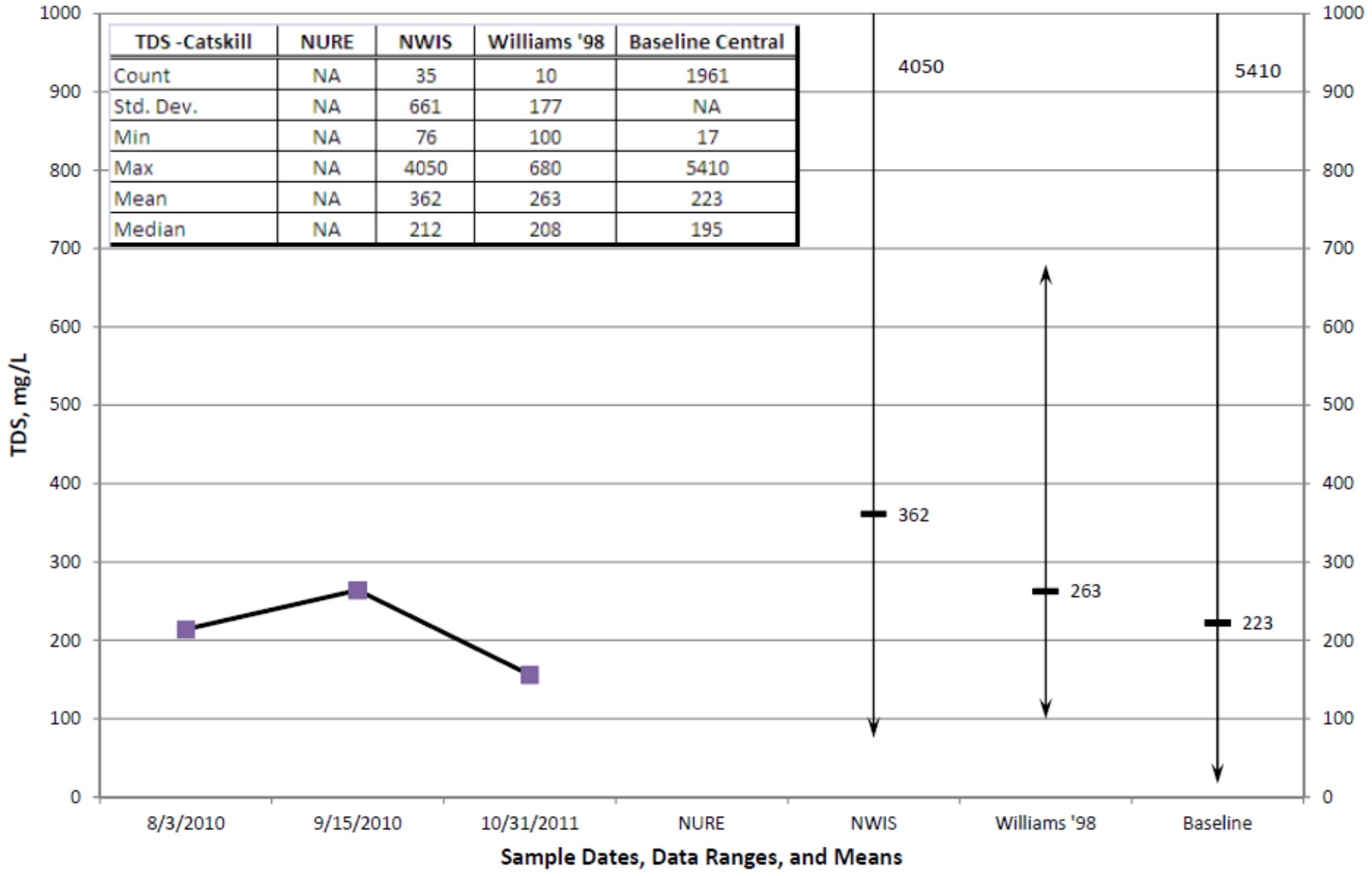



Property Owner I (142 ft.) Well Methane Concentrations vs. Time
Compared to NURE, NWIS, Williams '98, and Baseline Data
CH4 -Catskill | NURE | NWIS | Williams '98 | Baseline Central
Count | NA | NA | NA | 526
Std. Dev. | NA | NA | NA | NA
Min | NA | NA | NA | 0.005
Max | NA | NA | NA | 43.3
Mean | NA | NA | NA | 3.27
Median | NA | NA | NA | 0.359
43.3
3.27
Methane, mg/L
25
20
15
10
5
0
8/3/2010
9/15/2010
10/6/2010
10/20/2010
10/31/2011
NURE
NWIS
Williams '98
Baseline
Sample Dates, Data Ranges, and Means


Property Owner I (142 ft.) Well Sodium Concentrations vs. Time
Compared to NURE, NWIS, Williams '98, and Baseline Data
Na -Catskill | NURE | NWIS | Williams '98 | Baseline Central
Count | 51 | 17 | 10 | 1958
Std. Dev. | 20.9 | 197 | 47.4 | NA
Min | 2.77 | 4 | 5 | 1
Max | 145 | 829 | 132 | 1610
Mean | 14.0 | 85.1 | 42.0 | 33.1
Median | 8.58 | 23 | 18.5 | 14
145
829
132
1610
85.1
42.0
33.1
14.0
Sodium, mg/L
0
10
20
30
40
50
60
70
80
90
100
8/3/2010
9/15/2010
10/31/2011
NURE
NWIS
Williams '98
Baseline
Sample Dates, Data Ranges, and Means

Property Owner I (142 ft.) Well TDS Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

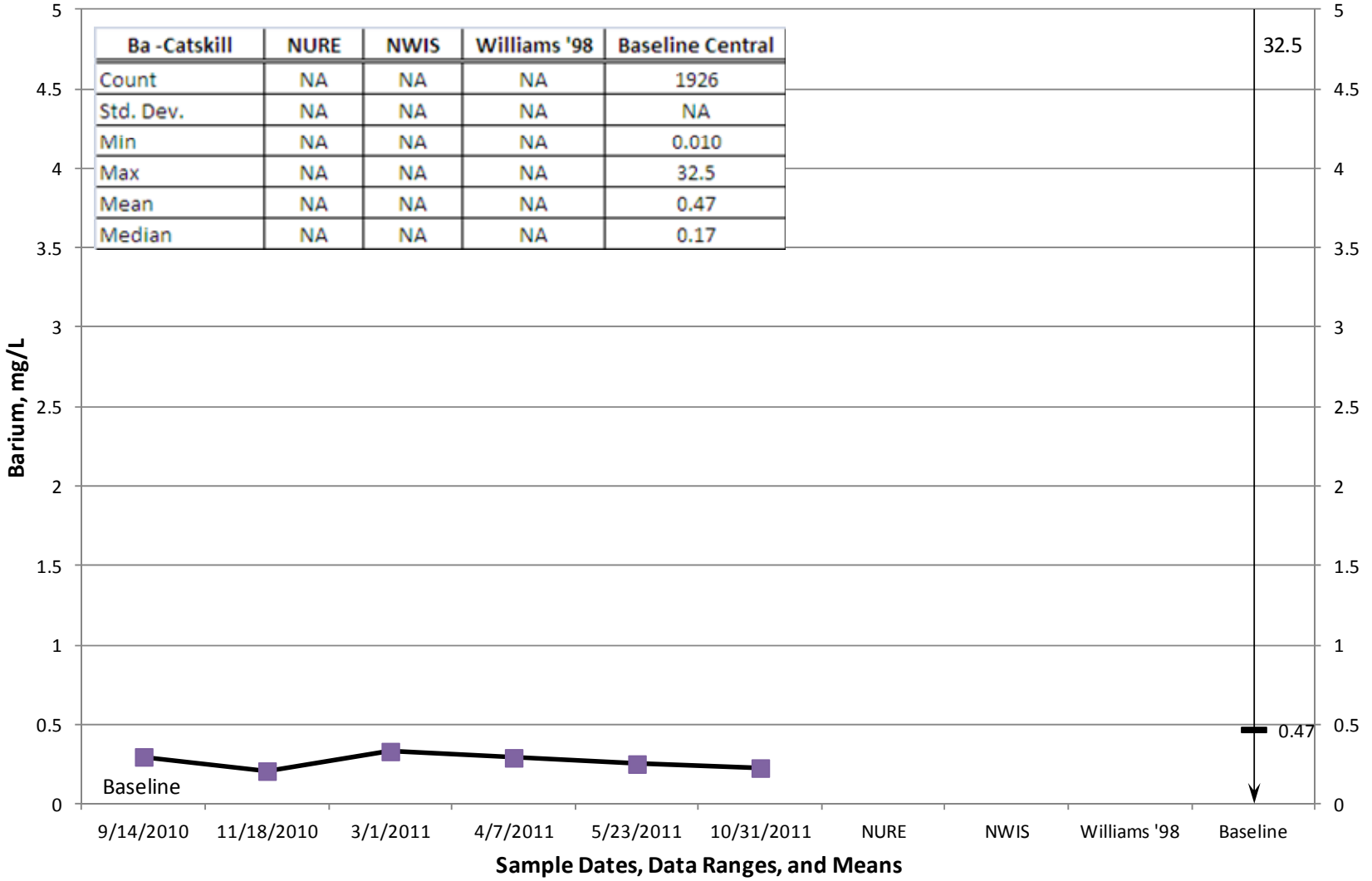
TDS -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	NA	35	10	1961
Std. Dev.	NA	661	177	NA
Min	NA	76	100	17
Max	NA	4050	680	5410
Mean	NA	362	263	223
Median	NA	212	208	195



APPENDIX D-11
TIME PLOTS
PROPERTY OWNER I (203-FT)

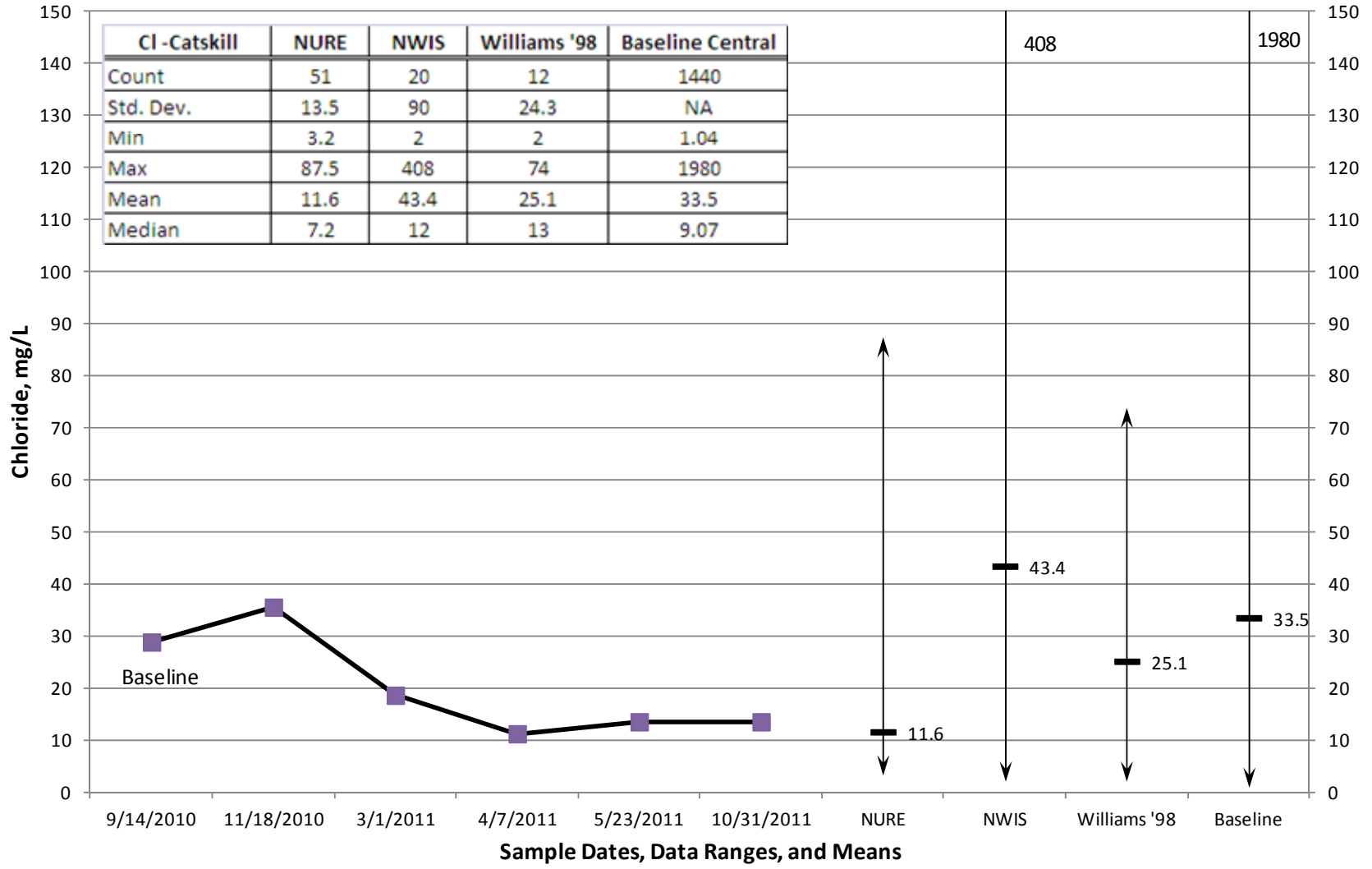
Property Owner I (203 ft.) Well Barium Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Ba -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	NA	NA	NA	1926
Std. Dev.	NA	NA	NA	NA
Min	NA	NA	NA	0.010
Max	NA	NA	NA	32.5
Mean	NA	NA	NA	0.47
Median	NA	NA	NA	0.17



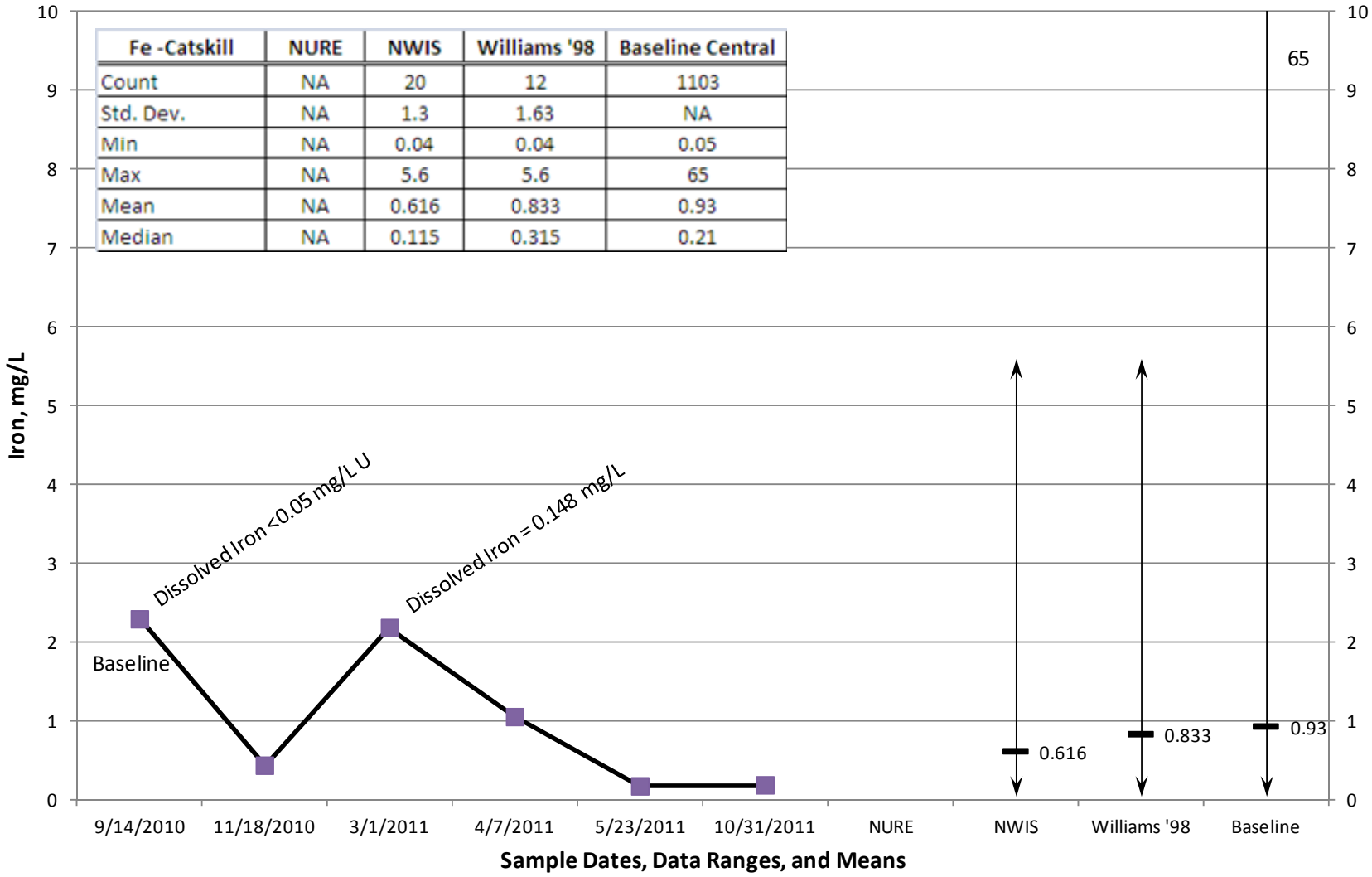
Property Owner I (203 ft.) Well Chloride Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Cl -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	51	20	12	1440
Std. Dev.	13.5	90	24.3	NA
Min	3.2	2	2	1.04
Max	87.5	408	74	1980
Mean	11.6	43.4	25.1	33.5
Median	7.2	12	13	9.07



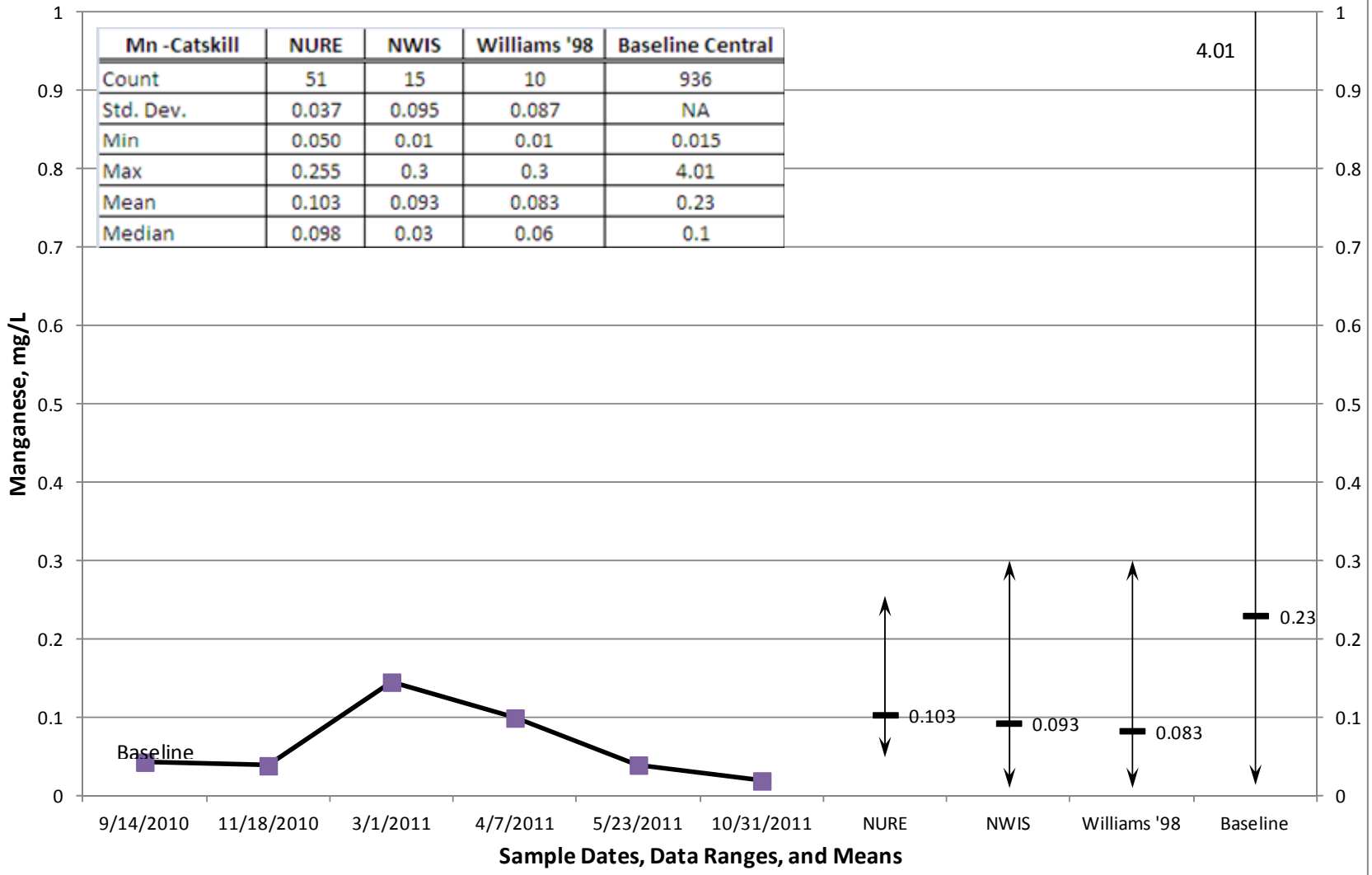
Property Owner I (203 ft) Well Iron Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Fe -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	NA	20	12	1103
Std. Dev.	NA	1.3	1.63	NA
Min	NA	0.04	0.04	0.05
Max	NA	5.6	5.6	65
Mean	NA	0.616	0.833	0.93
Median	NA	0.115	0.315	0.21



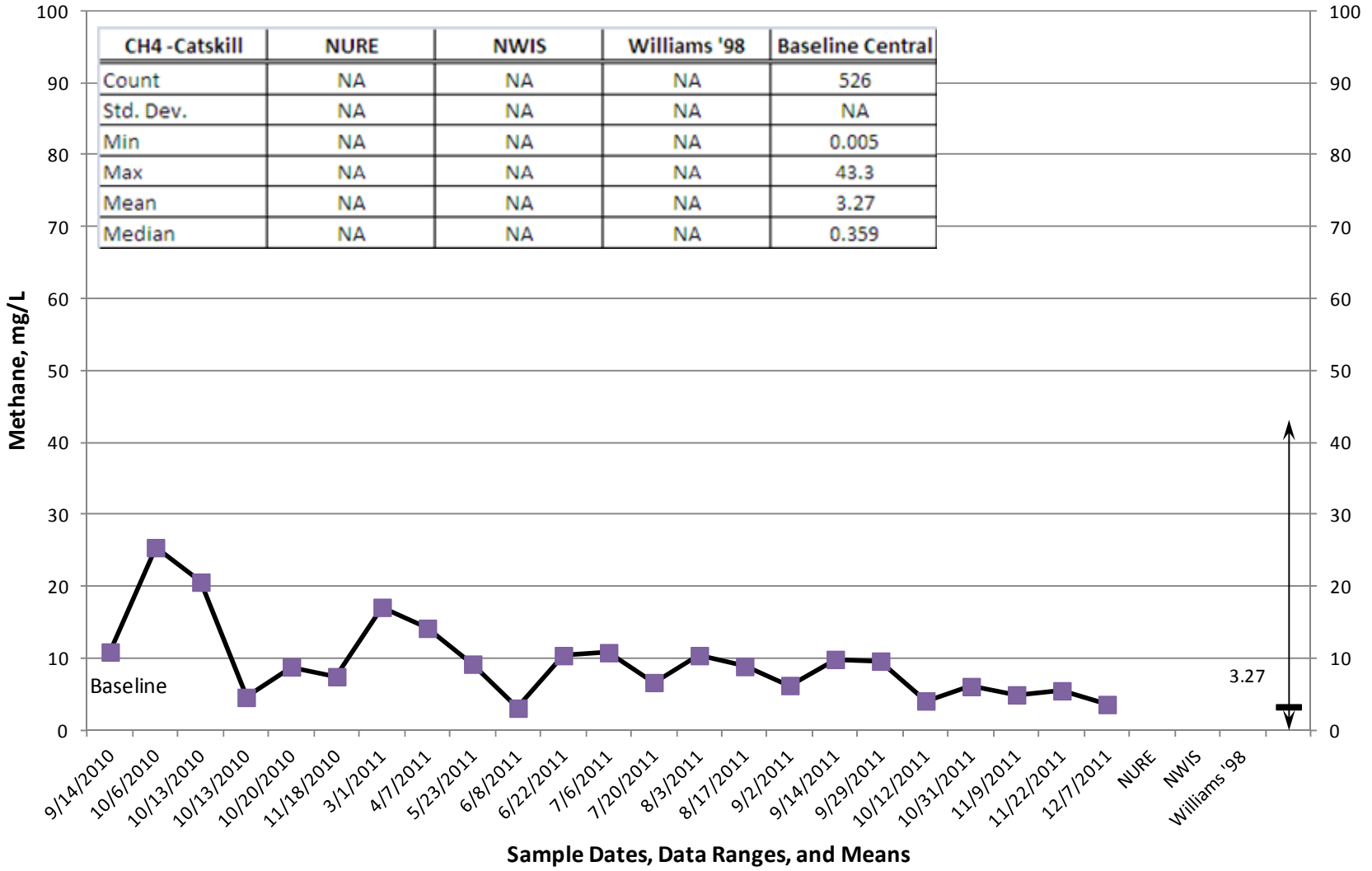
Property Owner I (203 ft.) Well Manganese Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Mn -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	51	15	10	936
Std. Dev.	0.037	0.095	0.087	NA
Min	0.050	0.01	0.01	0.015
Max	0.255	0.3	0.3	4.01
Mean	0.103	0.093	0.083	0.23
Median	0.098	0.03	0.06	0.1



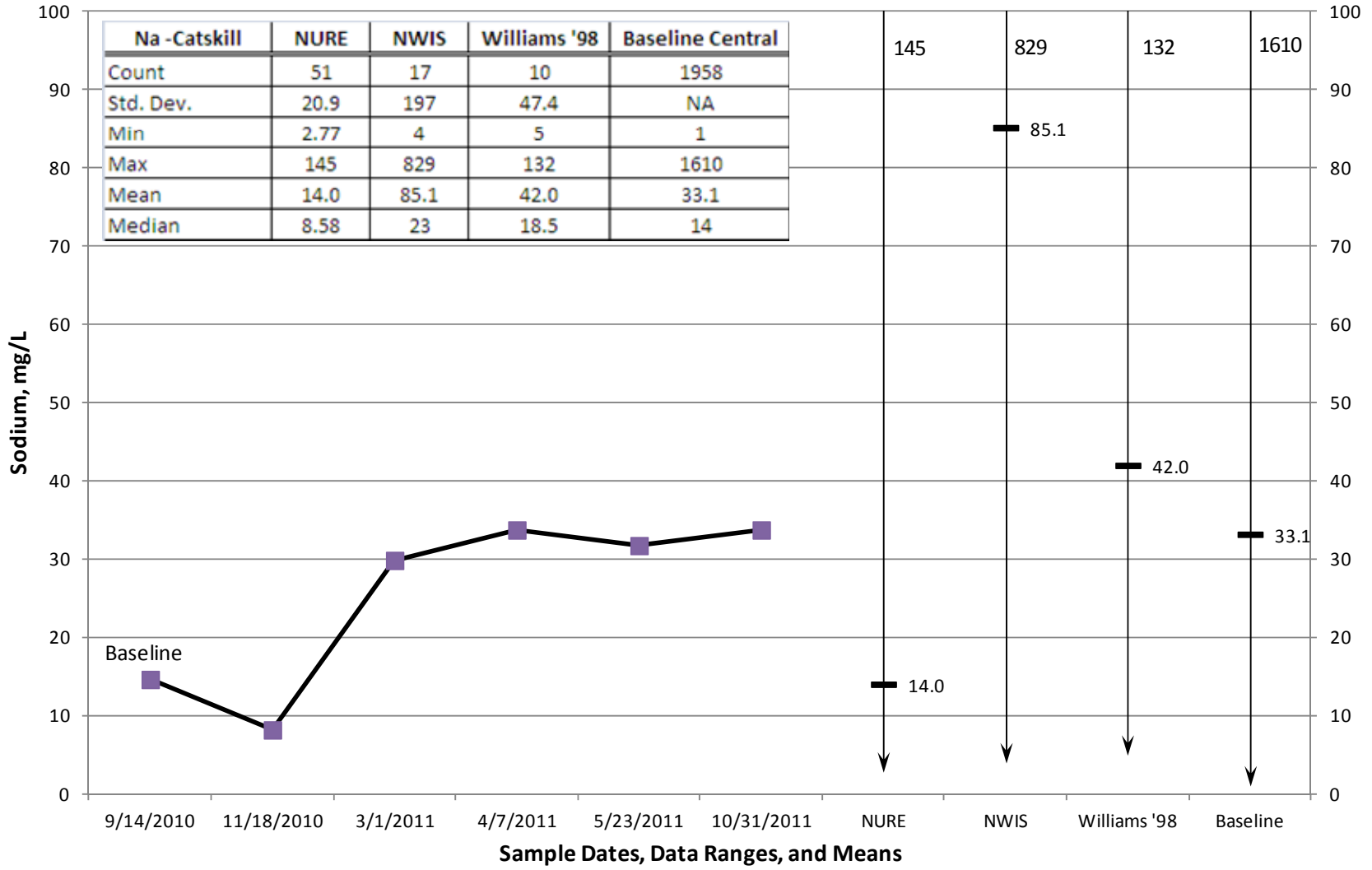
Property Owner I (203 ft.) Well Methane Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

CH4 -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	NA	NA	NA	526
Std. Dev.	NA	NA	NA	NA
Min	NA	NA	NA	0.005
Max	NA	NA	NA	43.3
Mean	NA	NA	NA	3.27
Median	NA	NA	NA	0.359



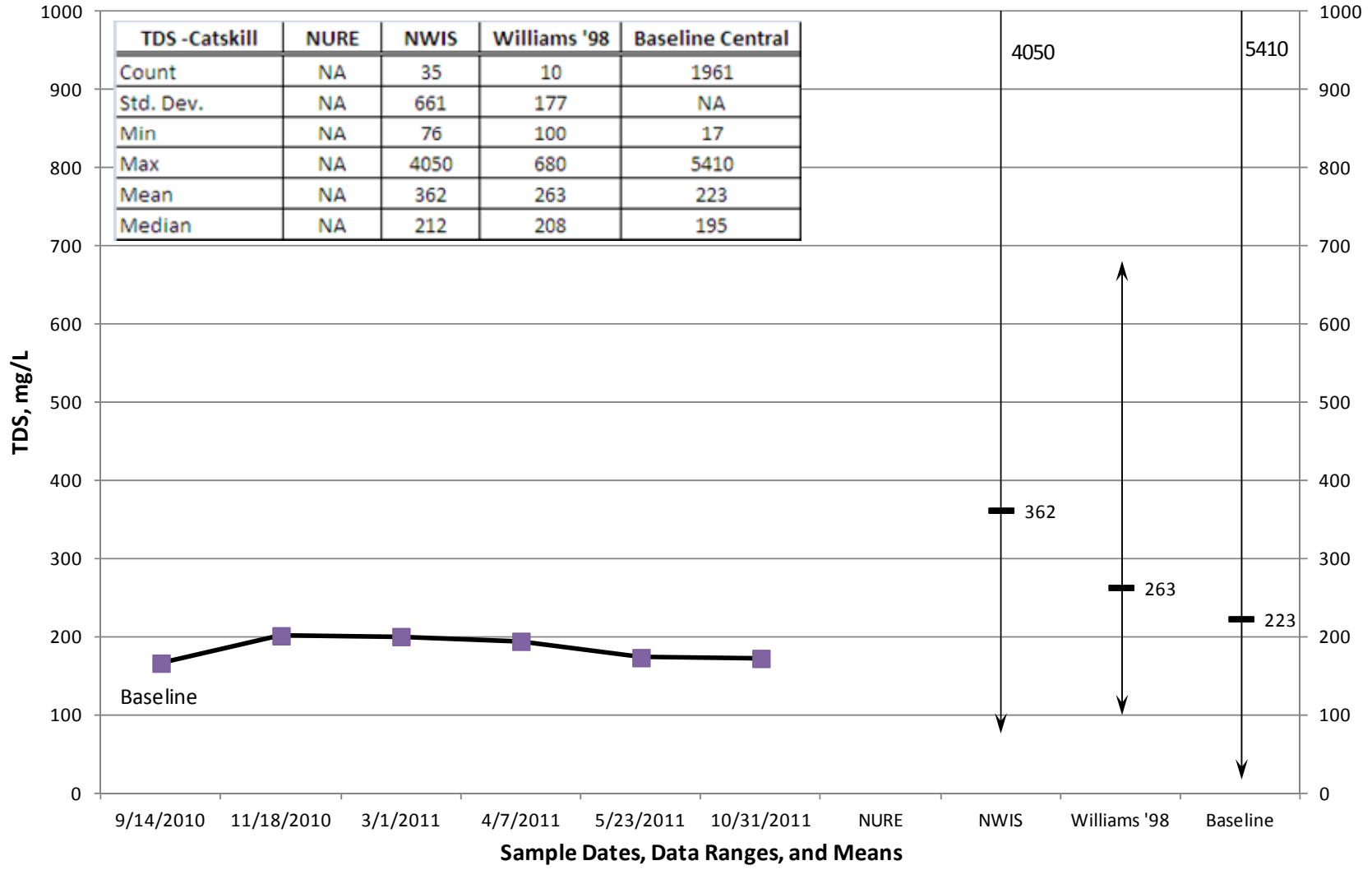
Property Owner I (203 ft.) Well Sodium Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Na -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	51	17	10	1958
Std. Dev.	20.9	197	47.4	NA
Min	2.77	4	5	1
Max	145	829	132	1610
Mean	14.0	85.1	42.0	33.1
Median	8.58	23	18.5	14

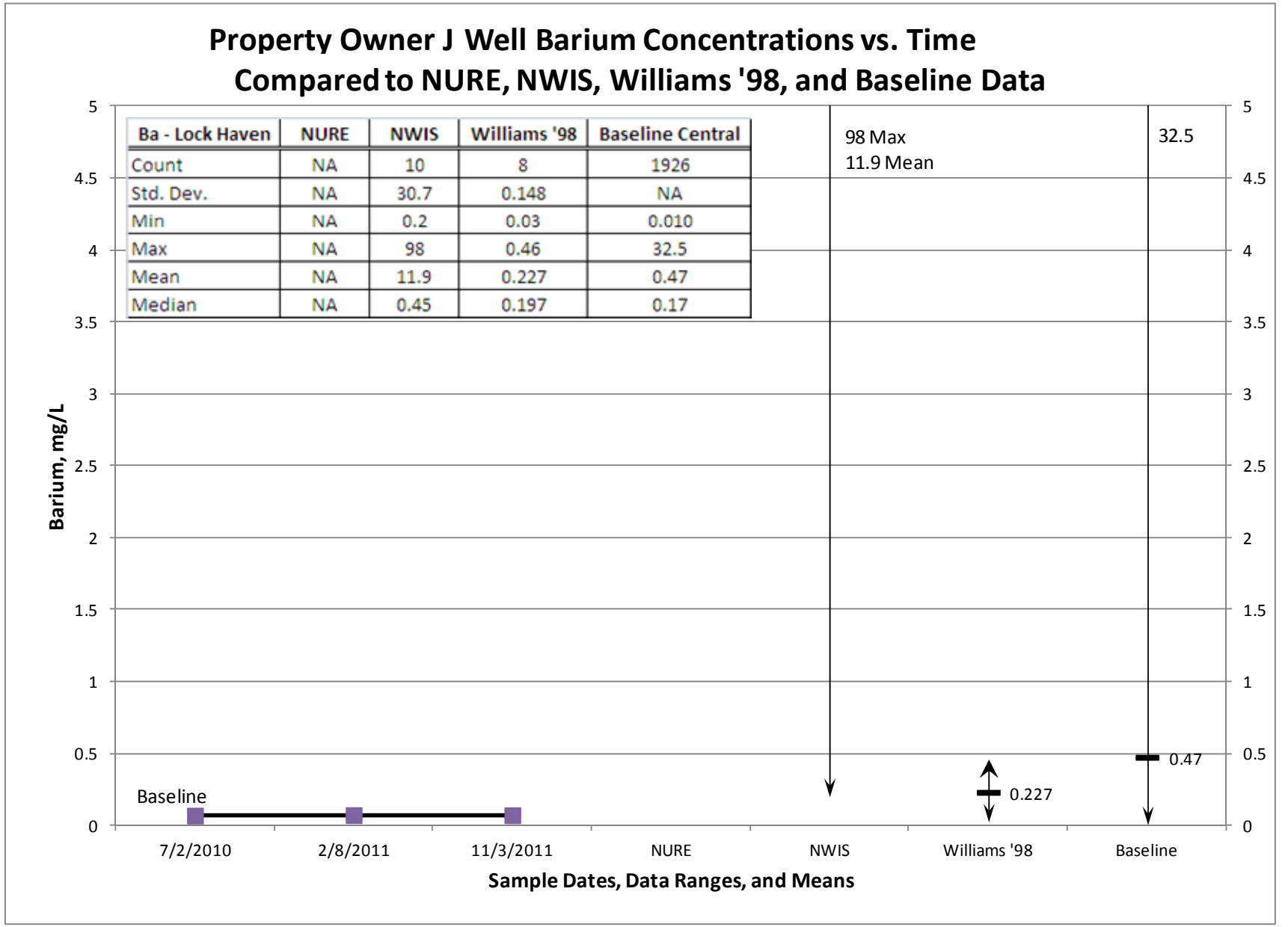


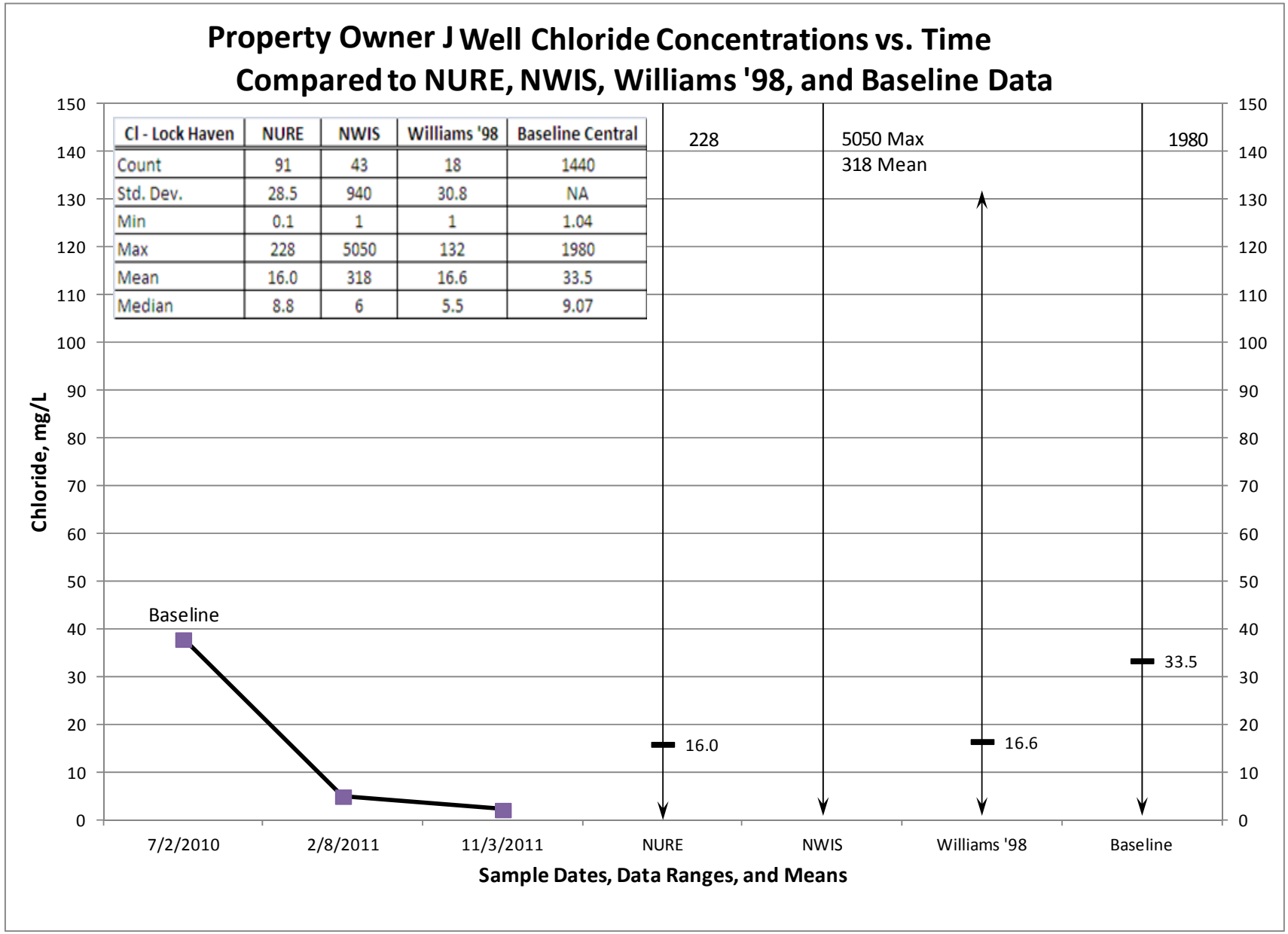
Property Owner I (203 ft.) Well TDS Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

TDS -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	NA	35	10	1961
Std. Dev.	NA	661	177	NA
Min	NA	76	100	17
Max	NA	4050	680	5410
Mean	NA	362	263	223
Median	NA	212	208	195



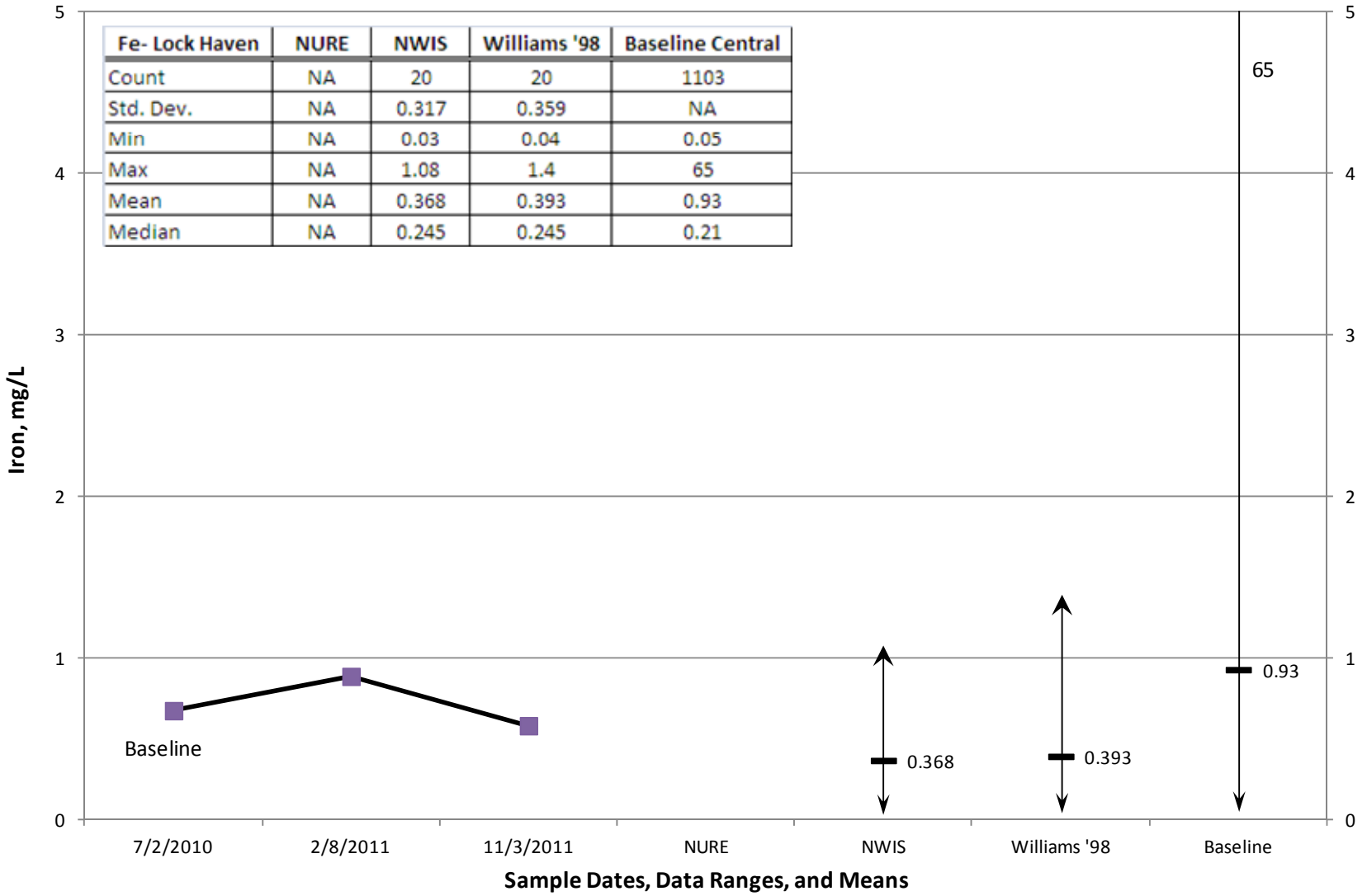
APPENDIX D-12
TIME PLOTS
PROPERTY OWNER J


Property Owner J Well Barium Concentrations vs. Time
Compared to NURE, NWIS, Williams '98, and Baseline Data
Ba - Lock Haven | NURE | NWIS | Williams '98 | Baseline Central
Count | NA | 10 | 8 | 1926
Std. Dev. | NA | 30.7 | 0.148 | NA
Min | NA | 0.2 | 0.03 | 0.010
Max | NA | 98 | 0.46 | 32.5
Mean | NA | 11.9 | 0.227 | 0.47
Median | NA | 0.45 | 0.197 | 0.17
98 Max
11.9 Mean
32.5
0.47
0.227
Baseline
Barium, mg/L
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
7/2/2010
2/8/2011
11/3/2011
NURE
NWIS
Williams '98
Baseline
Sample Dates, Data Ranges, and Means


Property Owner J Well Chloride Concentrations vs. Time
Compared to NURE, NWIS, Williams '98, and Baseline Data
Cl - Lock Haven | NURE | NWIS | Williams '98 | Baseline Central
Count | 91 | 43 | 18 | 1440
Std. Dev. | 28.5 | 940 | 30.8 | NA
Min | 0.1 | 1 | 1 | 1.04
Max | 228 | 5050 | 132 | 1980
Mean | 16.0 | 318 | 16.6 | 33.5
Median | 8.8 | 6 | 5.5 | 9.07
228
5050 Max
318 Mean
1980
Baseline
16.0
16.6
33.5
Chloride, mg/L
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
7/2/2010
2/8/2011
11/3/2011
NURE
NWIS
Williams '98
Baseline
Sample Dates, Data Ranges, and Means

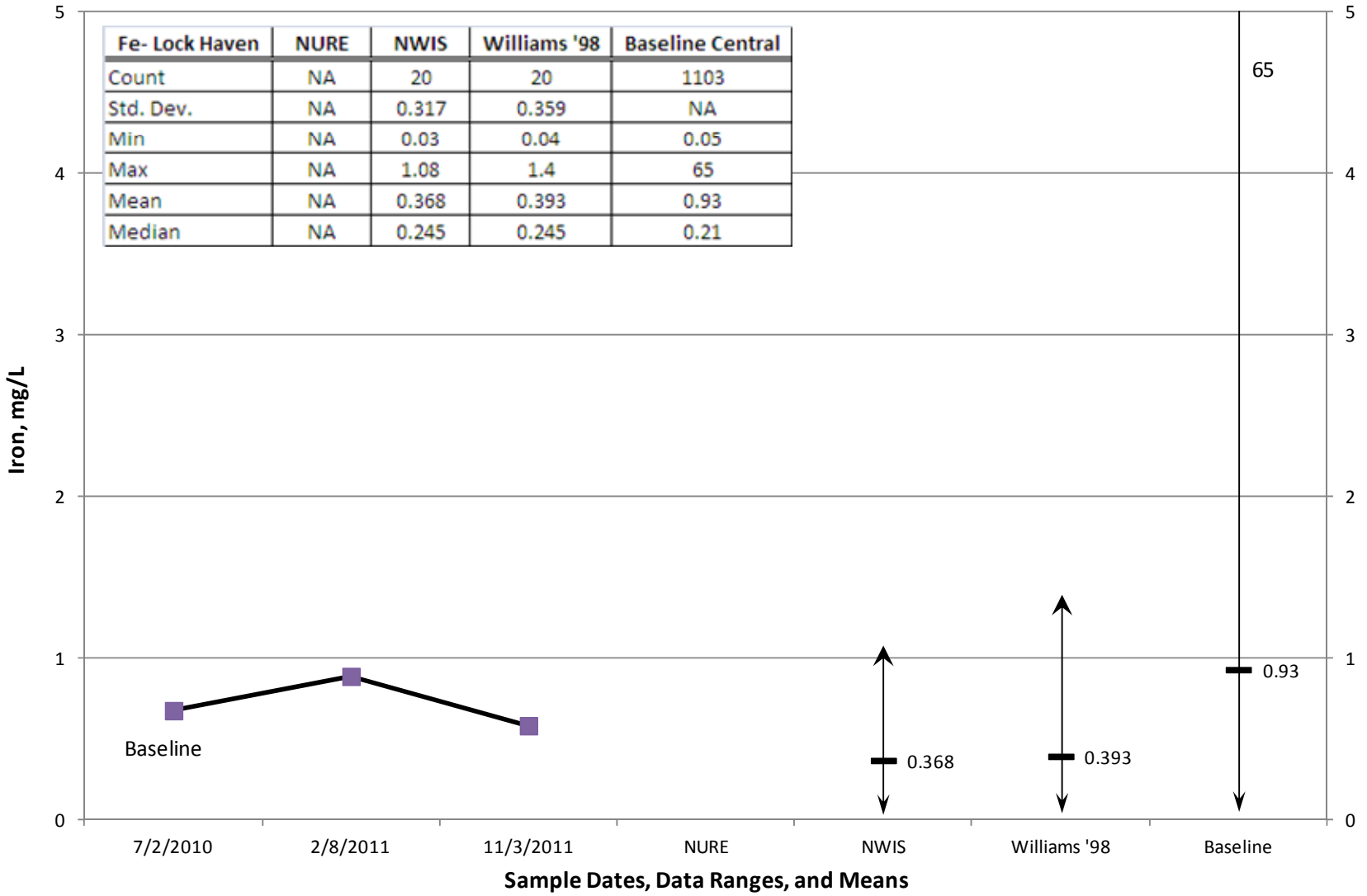
Property Owner J Well Iron Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Fe- Lock Haven	NURE	NWIS	Williams '98	Baseline Central
Count	NA	20	20	1103
Std. Dev.	NA	0.317	0.359	NA
Min	NA	0.03	0.04	0.05
Max	NA	1.08	1.4	65
Mean	NA	0.368	0.393	0.93
Median	NA	0.245	0.245	0.21



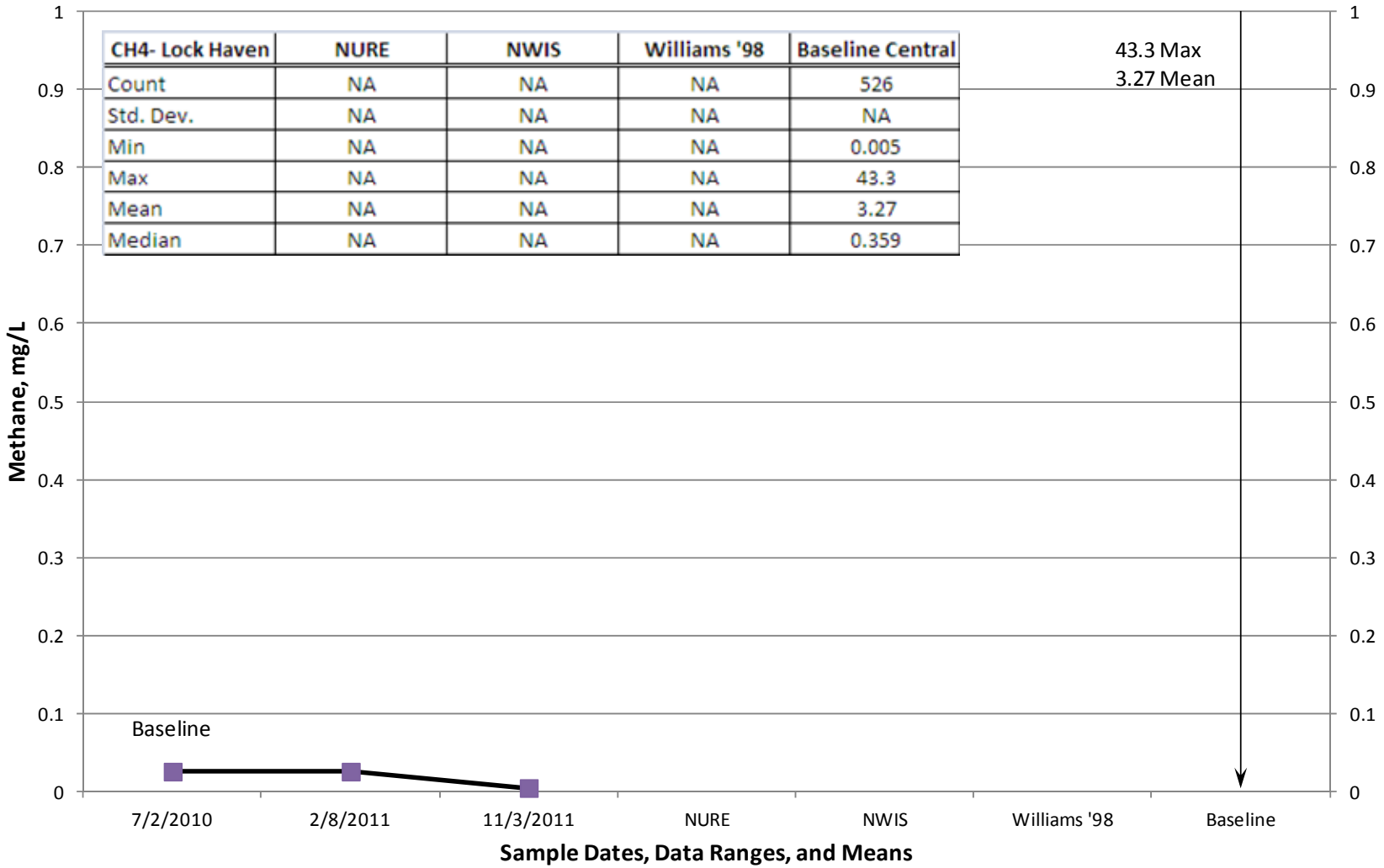
Property Owner J Well Iron Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Fe- Lock Haven	NURE	NWIS	Williams '98	Baseline Central
Count	NA	20	20	1103
Std. Dev.	NA	0.317	0.359	NA
Min	NA	0.03	0.04	0.05
Max	NA	1.08	1.4	65
Mean	NA	0.368	0.393	0.93
Median	NA	0.245	0.245	0.21



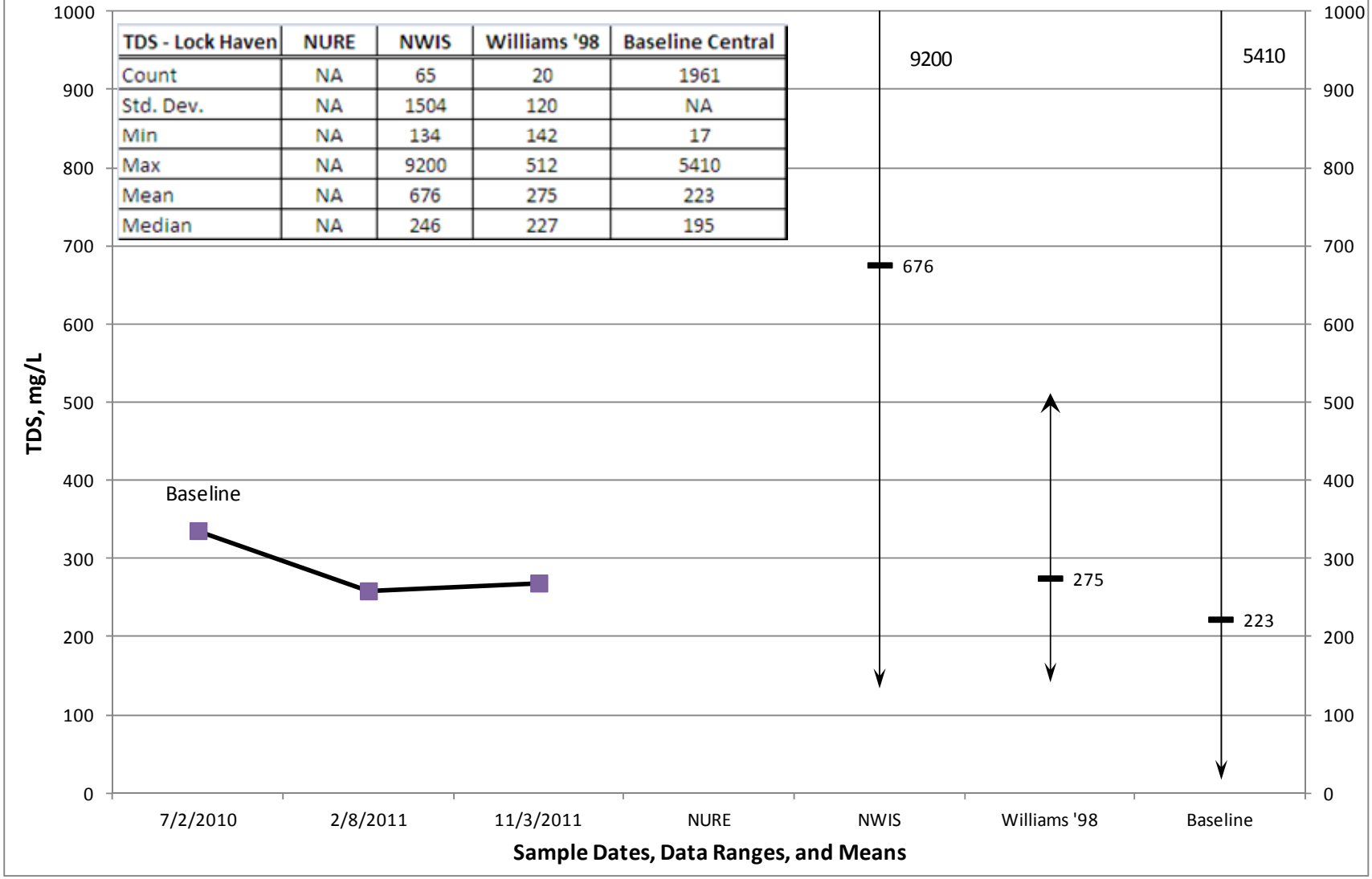
Property Owner J Well Methane Concentrations vs. Time Compared to NURE,NWIS, Williams '98, and Baseline Data

CH4- Lock Haven	NURE	NWIS	Williams '98	Baseline Central
Count	NA	NA	NA	526
Std. Dev.	NA	NA	NA	NA
Min	NA	NA	NA	0.005
Max	NA	NA	NA	43.3
Mean	NA	NA	NA	3.27
Median	NA	NA	NA	0.359

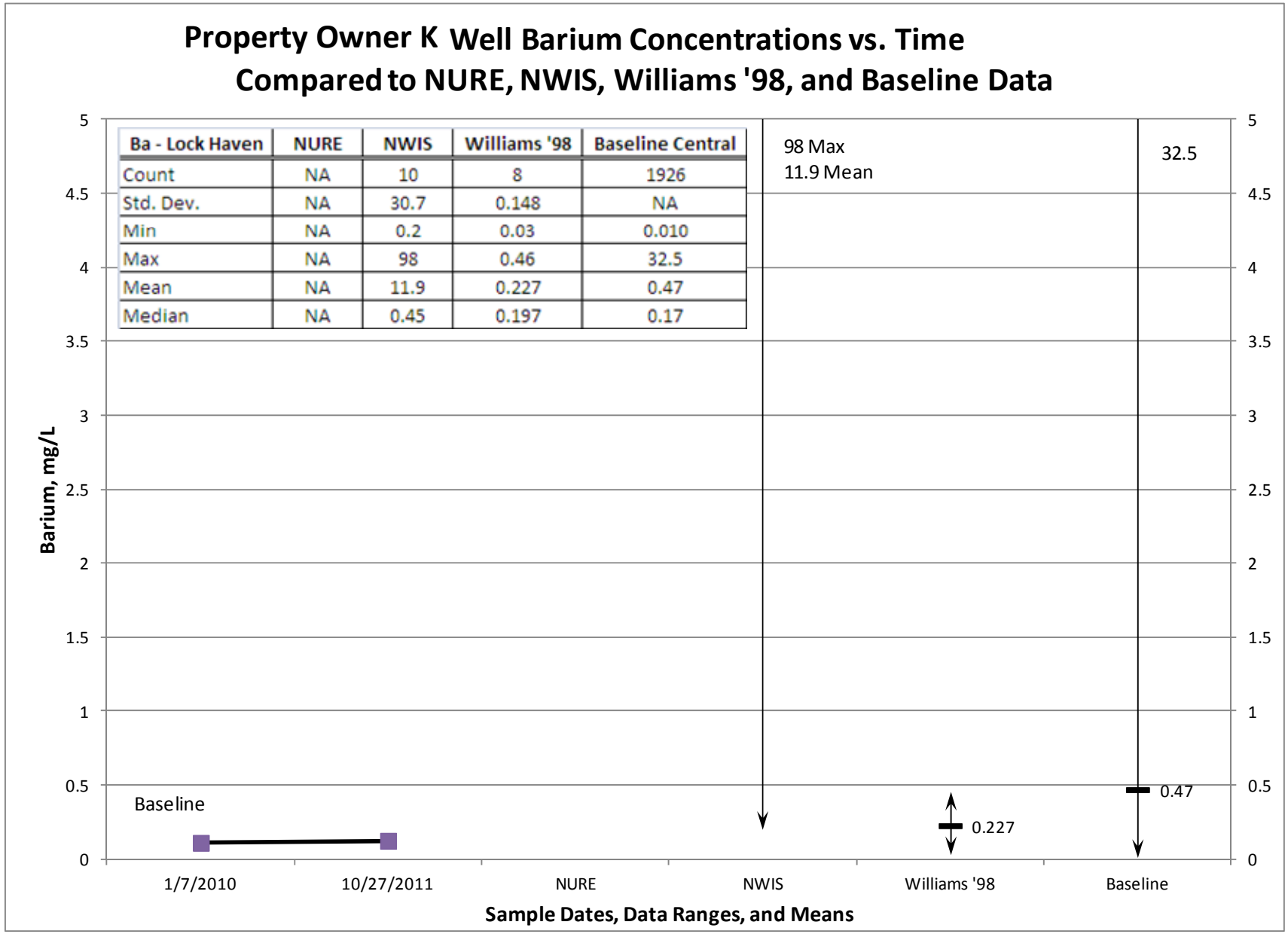


Property Owner J Well TDS Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

TDS - Lock Haven	NURE	NWIS	Williams '98	Baseline Central
Count	NA	65	20	1961
Std. Dev.	NA	1504	120	NA
Min	NA	134	142	17
Max	NA	9200	512	5410
Mean	NA	676	275	223
Median	NA	246	227	195

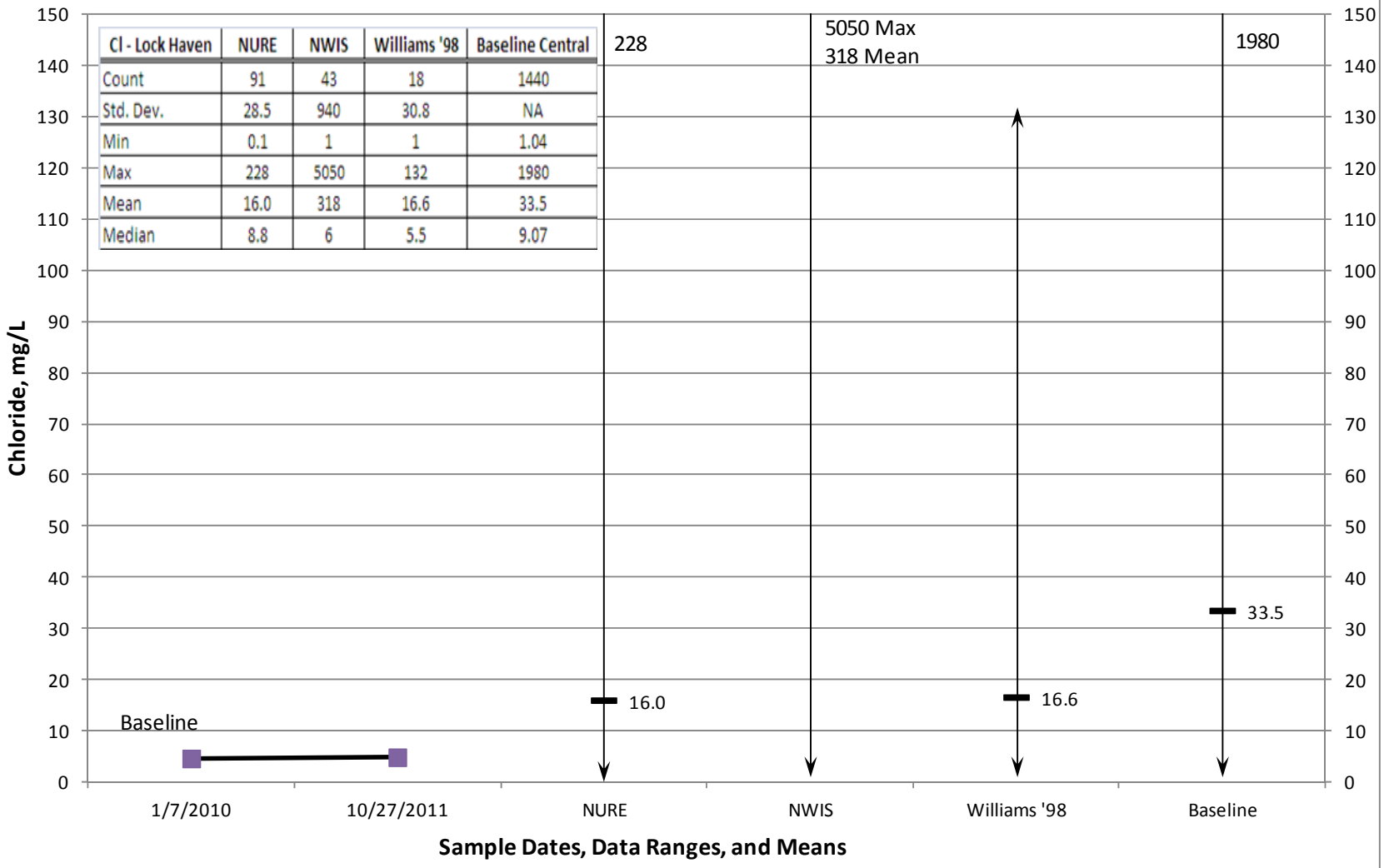


APPENDIX D-13
TIME PLOTS
PROPERTY OWNER K


Property Owner K Well Barium Concentrations vs. Time
Compared to NURE, NWIS, Williams '98, and Baseline Data
Ba - Lock Haven | NURE | NWIS | Williams '98 | Baseline Central
Count | NA | 10 | 8 | 1926
Std. Dev. | NA | 30.7 | 0.148 | NA
Min | NA | 0.2 | 0.03 | 0.010
Max | NA | 98 | 0.46 | 32.5
Mean | NA | 11.9 | 0.227 | 0.47
Median | NA | 0.45 | 0.197 | 0.17
98 Max
11.9 Mean
32.5
Barium, mg/L
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Baseline
0.227
0.47
1/7/2010
10/27/2011
NURE
NWIS
Williams '98
Baseline
Sample Dates, Data Ranges, and Means

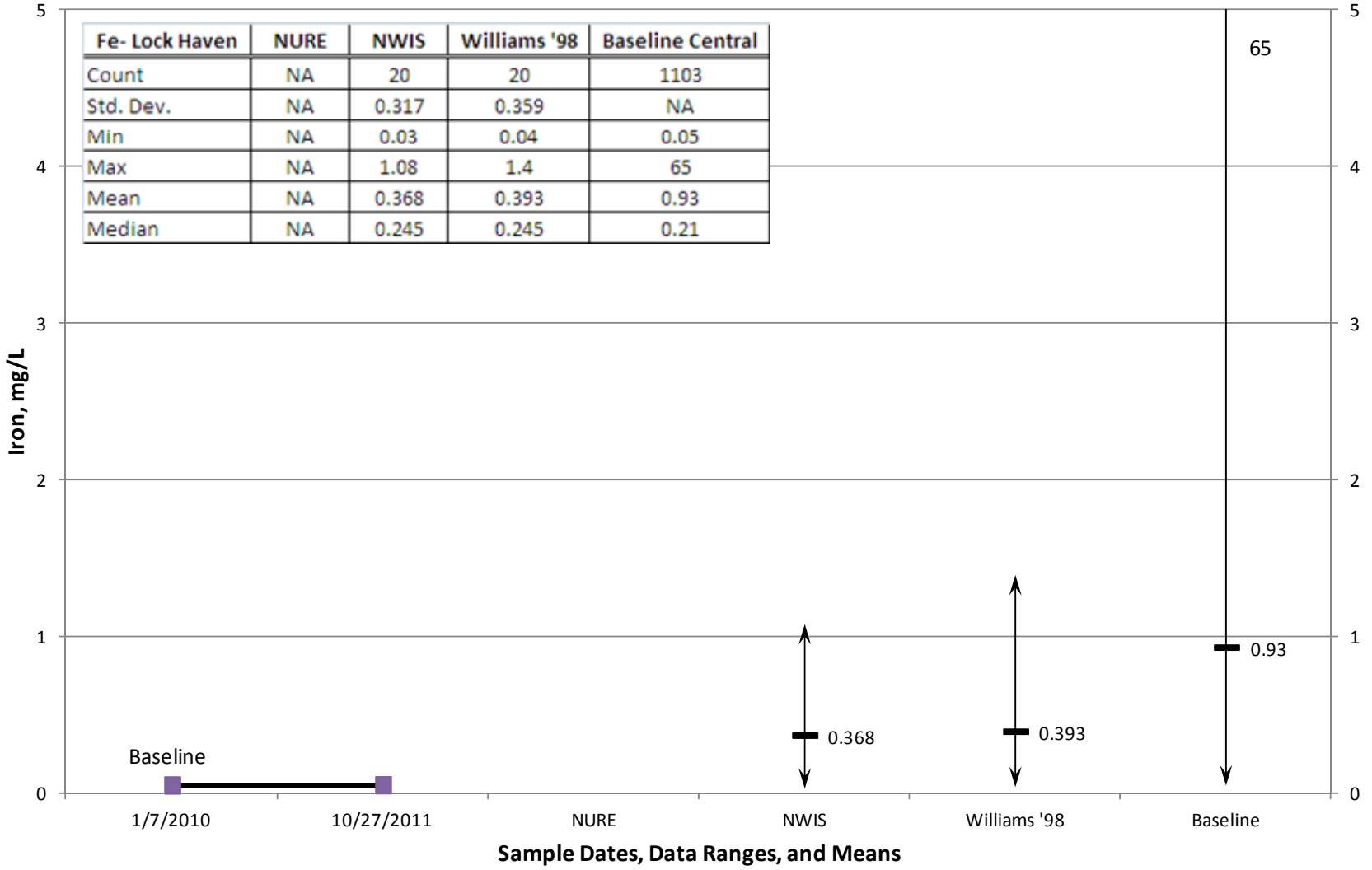
Property Owner K Well Chloride Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Cl - Lock Haven	NURE	NWIS	Williams '98	Baseline Central
Count	91	43	18	1440
Std. Dev.	28.5	940	30.8	NA
Min	0.1	1	1	1.04
Max	228	5050	132	1980
Mean	16.0	318	16.6	33.5
Median	8.8	6	5.5	9.07



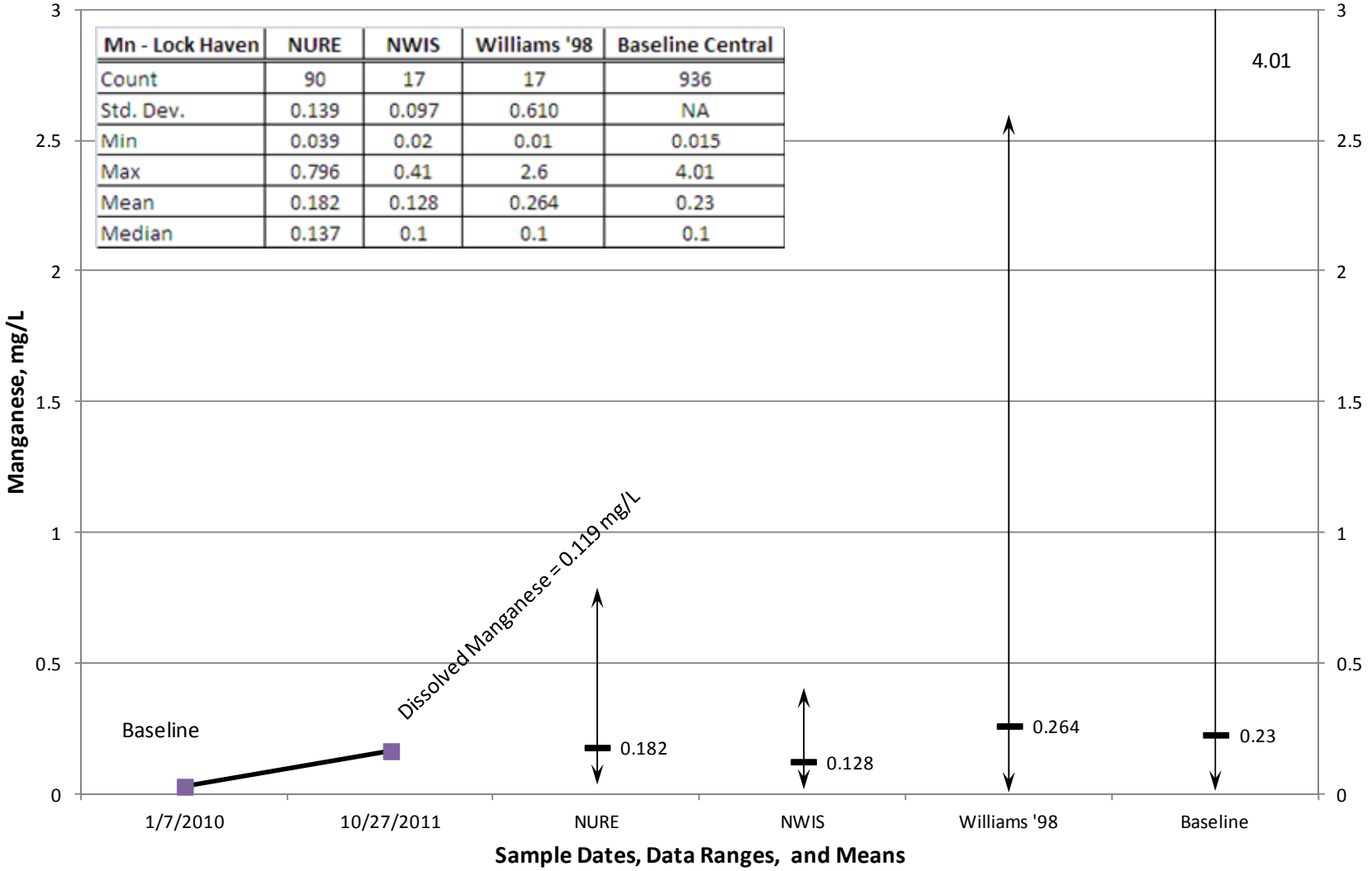
Property Owner K Well Iron Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Fe- Lock Haven	NURE	NWIS	Williams '98	Baseline Central
Count	NA	20	20	1103
Std. Dev.	NA	0.317	0.359	NA
Min	NA	0.03	0.04	0.05
Max	NA	1.08	1.4	65
Mean	NA	0.368	0.393	0.93
Median	NA	0.245	0.245	0.21



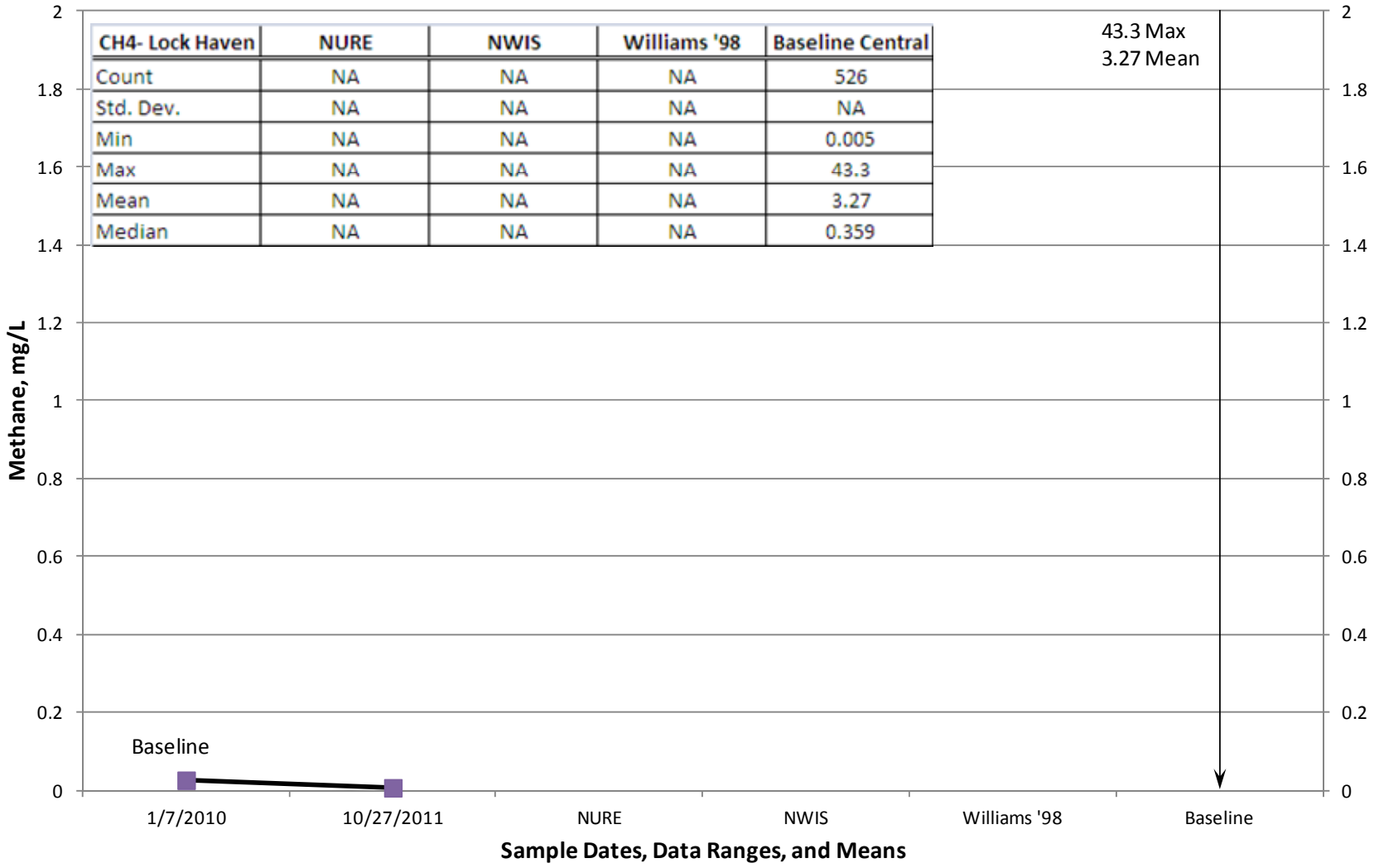
Property Owner K Well Manganese Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Mn - Lock Haven	NURE	NWIS	Williams '98	Baseline Central
Count	90	17	17	936
Std. Dev.	0.139	0.097	0.610	NA
Min	0.039	0.02	0.01	0.015
Max	0.796	0.41	2.6	4.01
Mean	0.182	0.128	0.264	0.23
Median	0.137	0.1	0.1	0.1



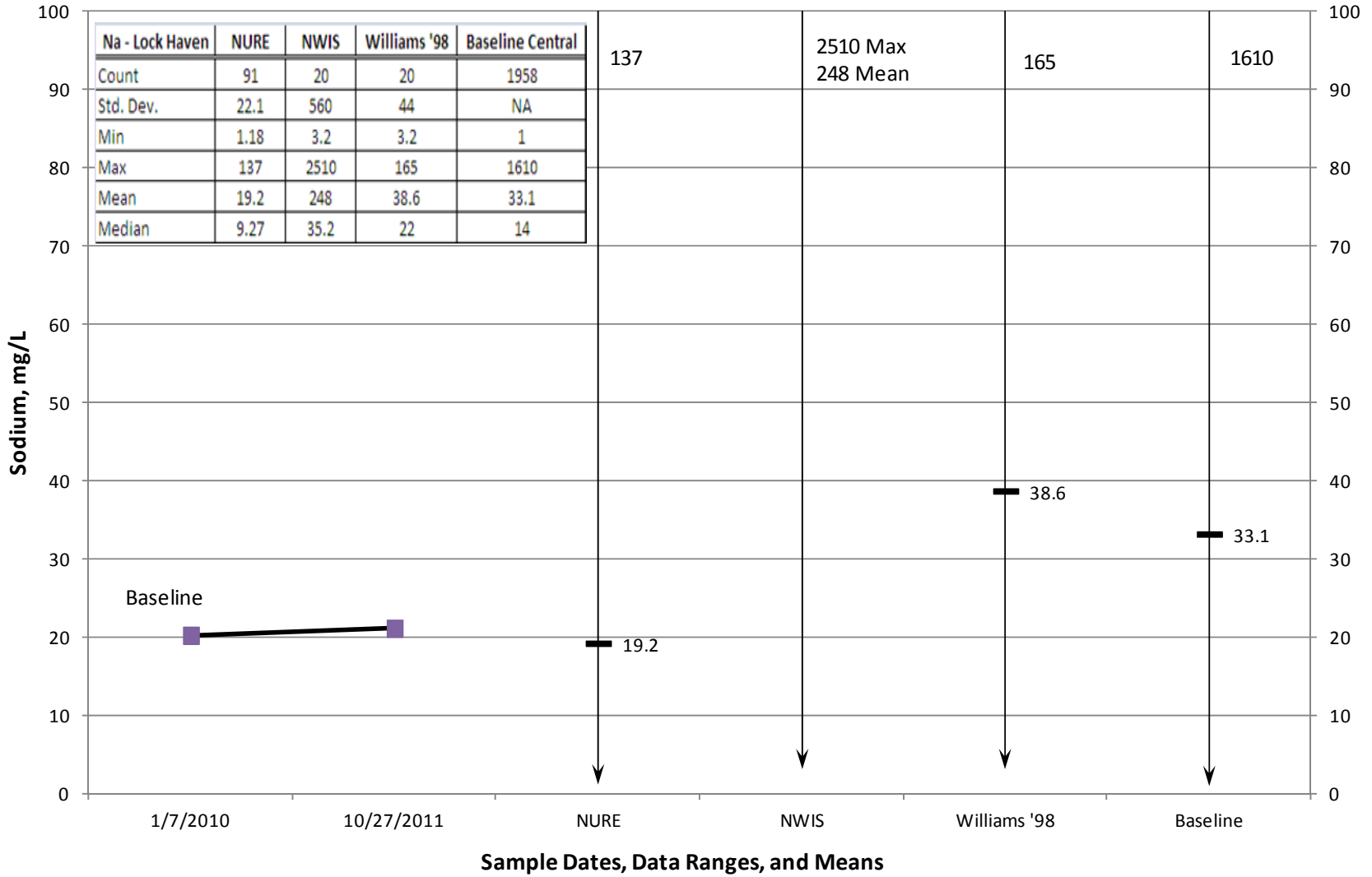
Property Owner K Well Methane Concentrations vs. Time Compared to NURE, NWIS Data, Williams '98, and Baseline Data

CH4- Lock Haven	NURE	NWIS	Williams '98	Baseline Central
Count	NA	NA	NA	526
Std. Dev.	NA	NA	NA	NA
Min	NA	NA	NA	0.005
Max	NA	NA	NA	43.3
Mean	NA	NA	NA	3.27
Median	NA	NA	NA	0.359



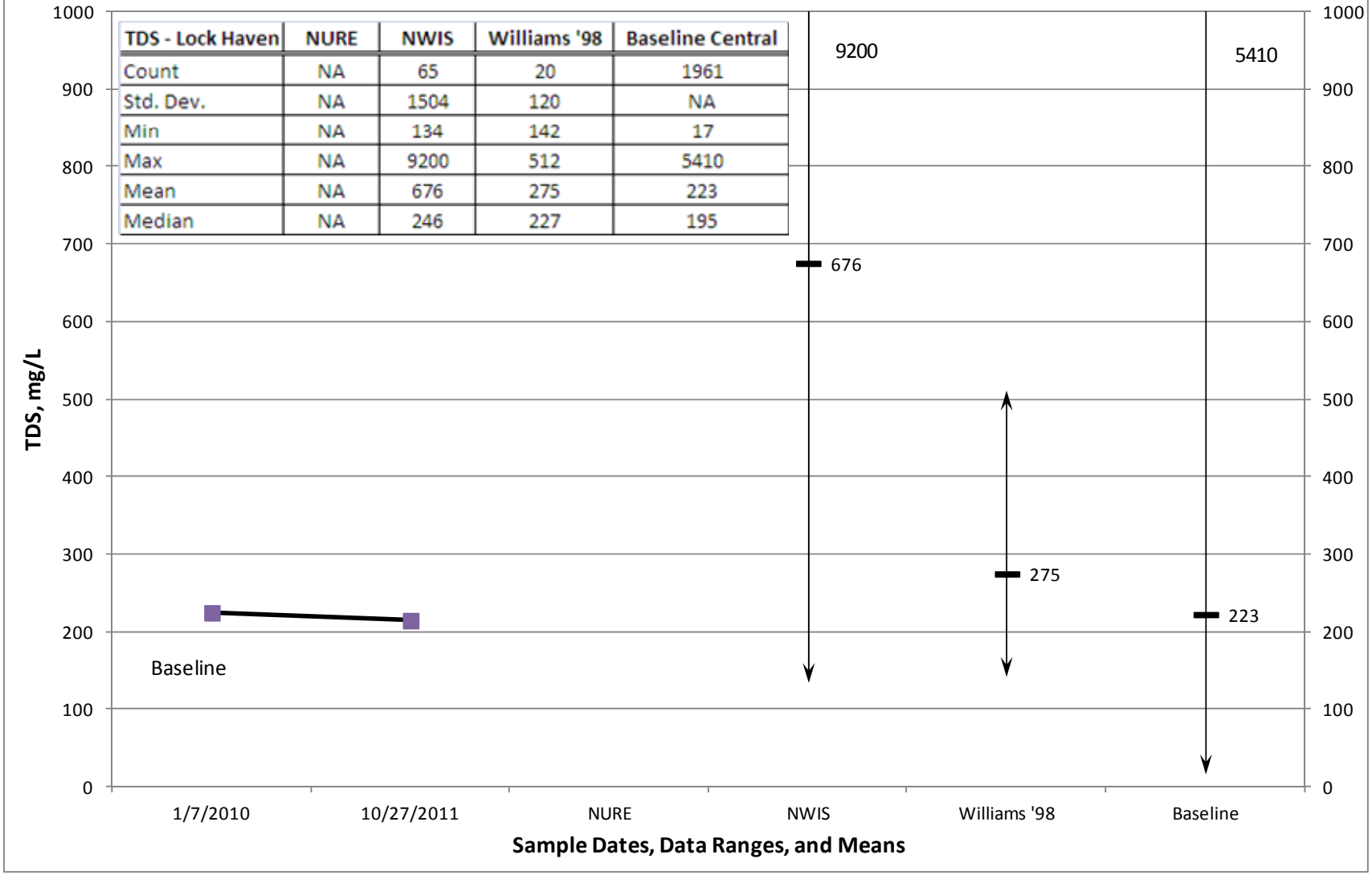
Property Owner K Well Sodium Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Na - Lock Haven	NURE	NWIS	Williams '98	Baseline Central
Count	91	20	20	1958
Std. Dev.	22.1	560	44	NA
Min	1.18	3.2	3.2	1
Max	137	2510	165	1610
Mean	19.2	248	38.6	33.1
Median	9.27	35.2	22	14



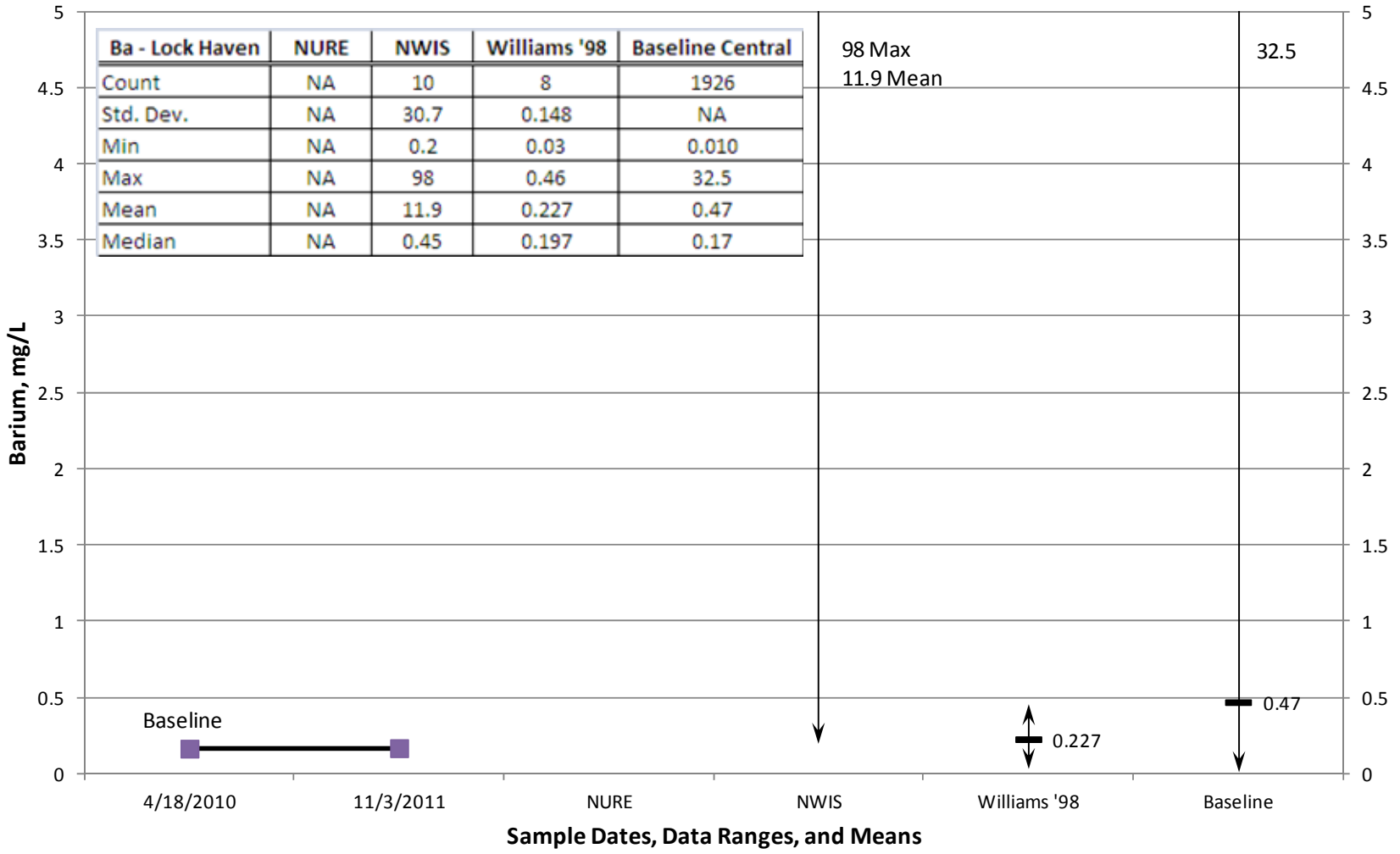
Property Owner K Well TDS Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

TDS - Lock Haven	NURE	NWIS	Williams '98	Baseline Central
Count	NA	65	20	1961
Std. Dev.	NA	1504	120	NA
Min	NA	134	142	17
Max	NA	9200	512	5410
Mean	NA	676	275	223
Median	NA	246	227	195



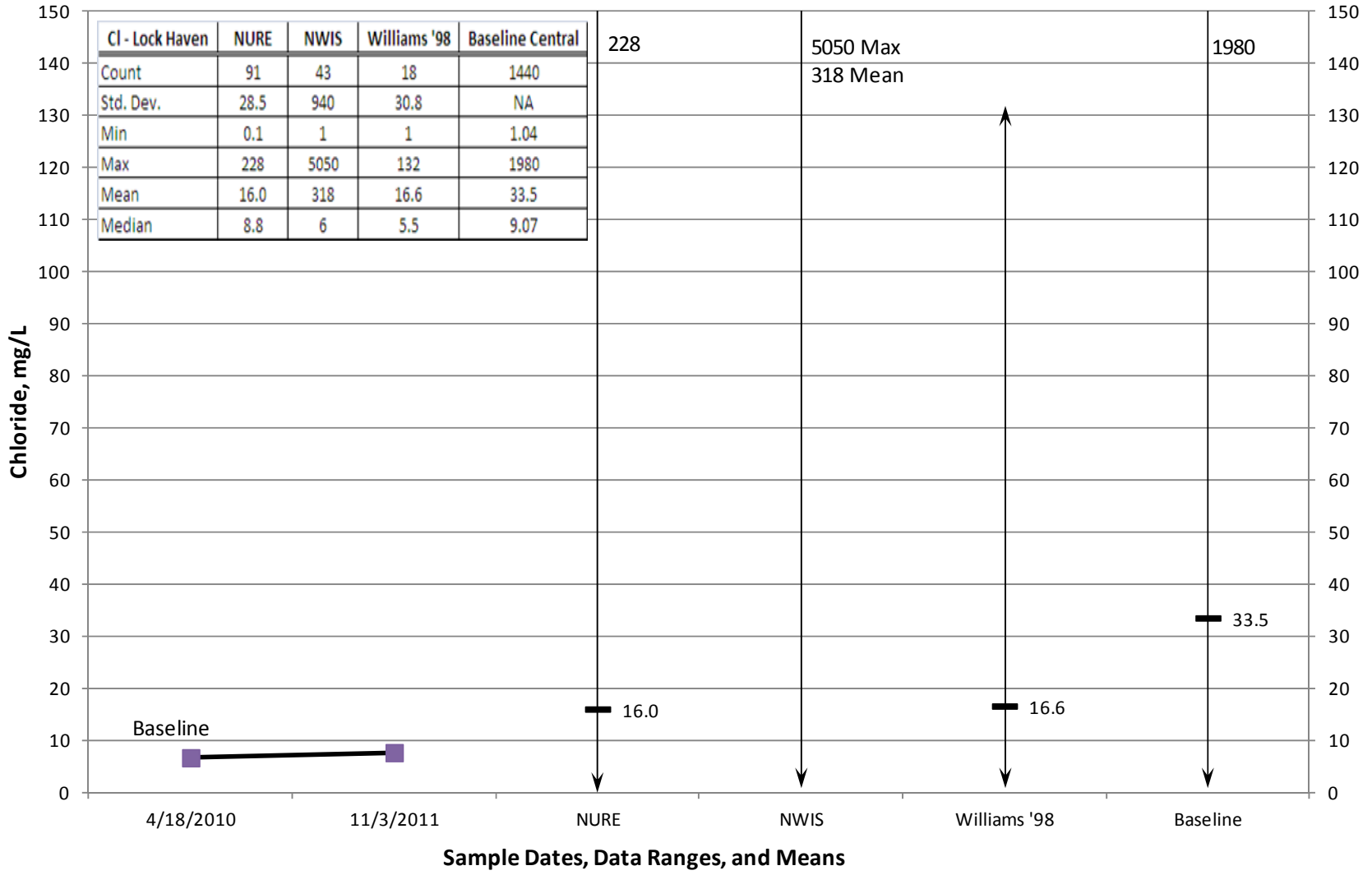
APPENDIX D-14
TIME PLOTS
PROPERTY OWNER L

Property Owner L Well Barium Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data



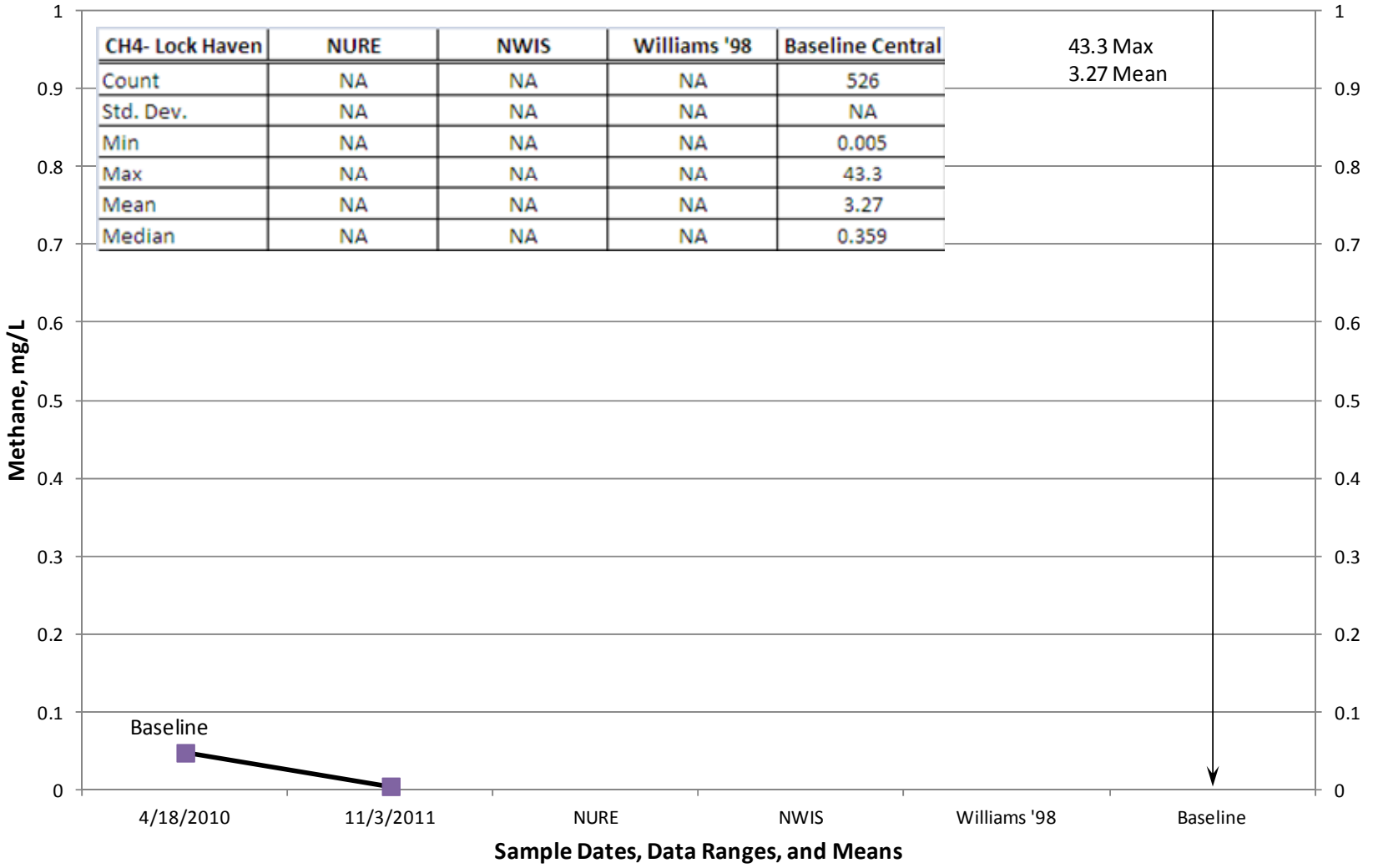
Property Owner L Well Chloride Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Cl - Lock Haven	NURE	NWIS	Williams '98	Baseline Central
Count	91	43	18	1440
Std. Dev.	28.5	940	30.8	NA
Min	0.1	1	1	1.04
Max	228	5050	132	1980
Mean	16.0	318	16.6	33.5
Median	8.8	6	5.5	9.07



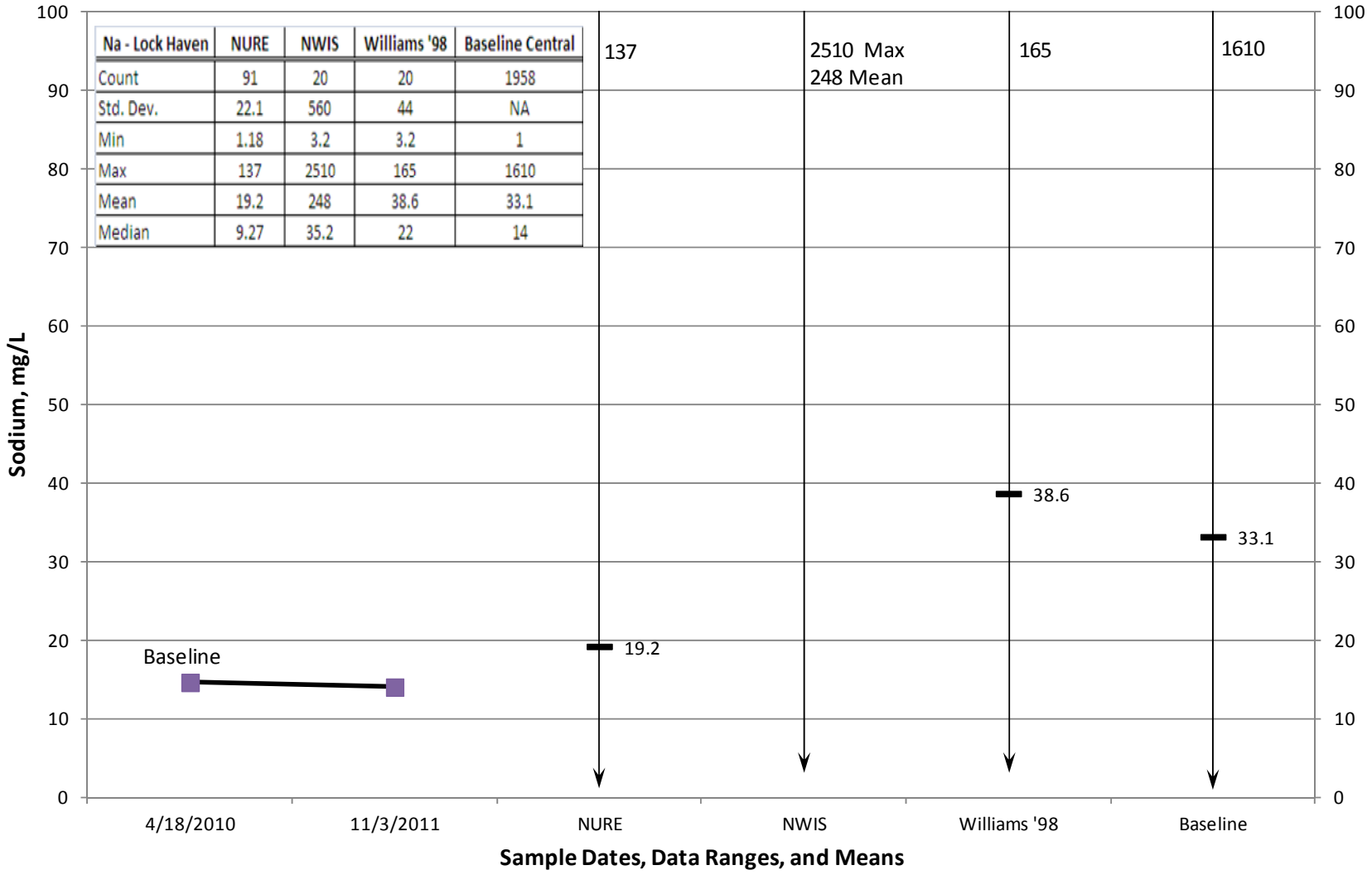
Property Owner L Well Methane Concentrations vs. Time Compared to NURE,NWIS, Williams '98, and Baseline Data

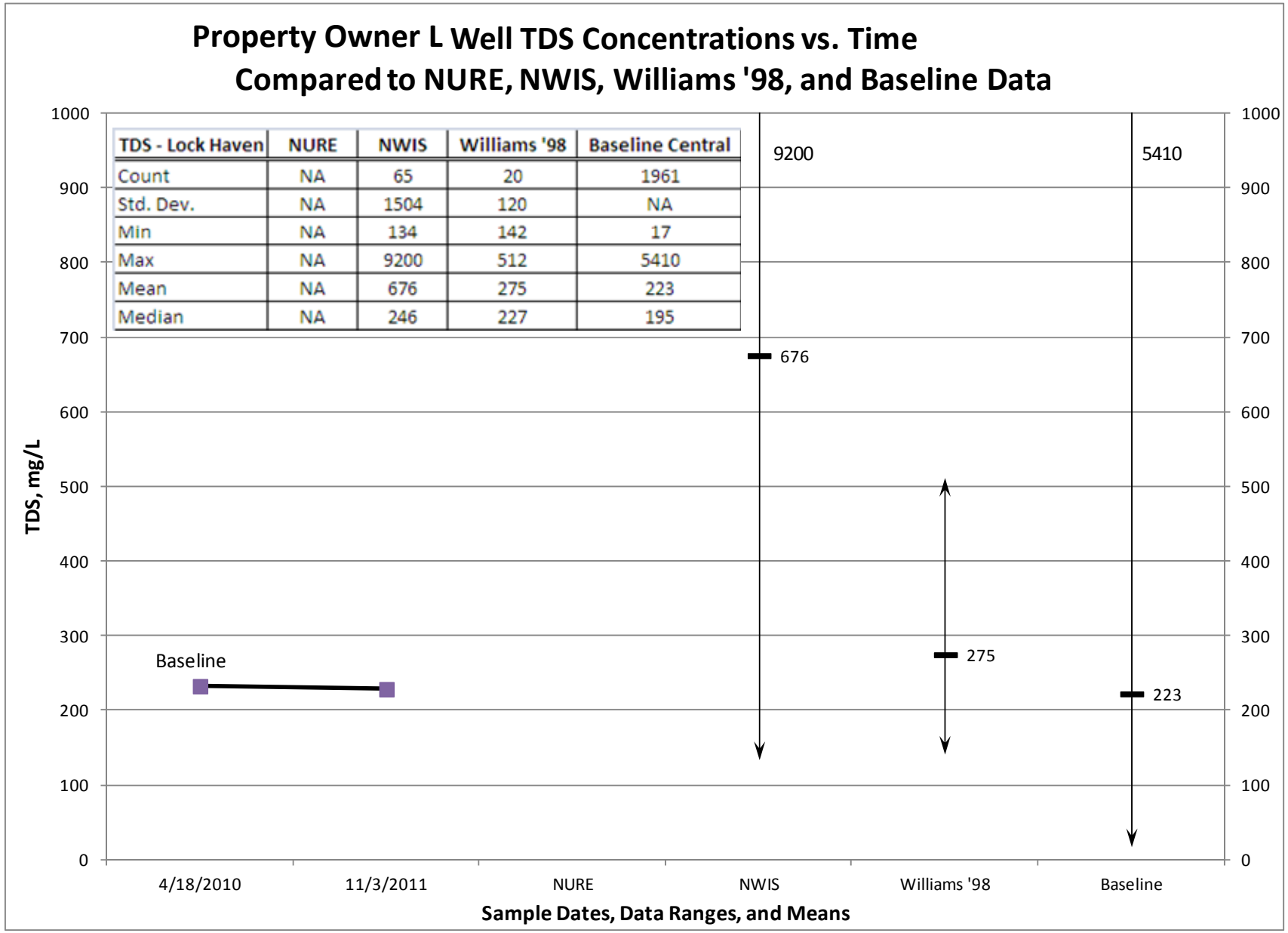
CH4- Lock Haven	NURE	NWIS	Williams '98	Baseline Central
Count	NA	NA	NA	526
Std. Dev.	NA	NA	NA	NA
Min	NA	NA	NA	0.005
Max	NA	NA	NA	43.3
Mean	NA	NA	NA	3.27
Median	NA	NA	NA	0.359



Property Owner L Well Sodium Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Na - Lock Haven	NURE	NWIS	Williams '98	Baseline Central
Count	91	20	20	1958
Std. Dev.	22.1	560	44	NA
Min	1.18	3.2	3.2	1
Max	137	2510	165	1610
Mean	19.2	248	38.6	33.1
Median	9.27	35.2	22	14

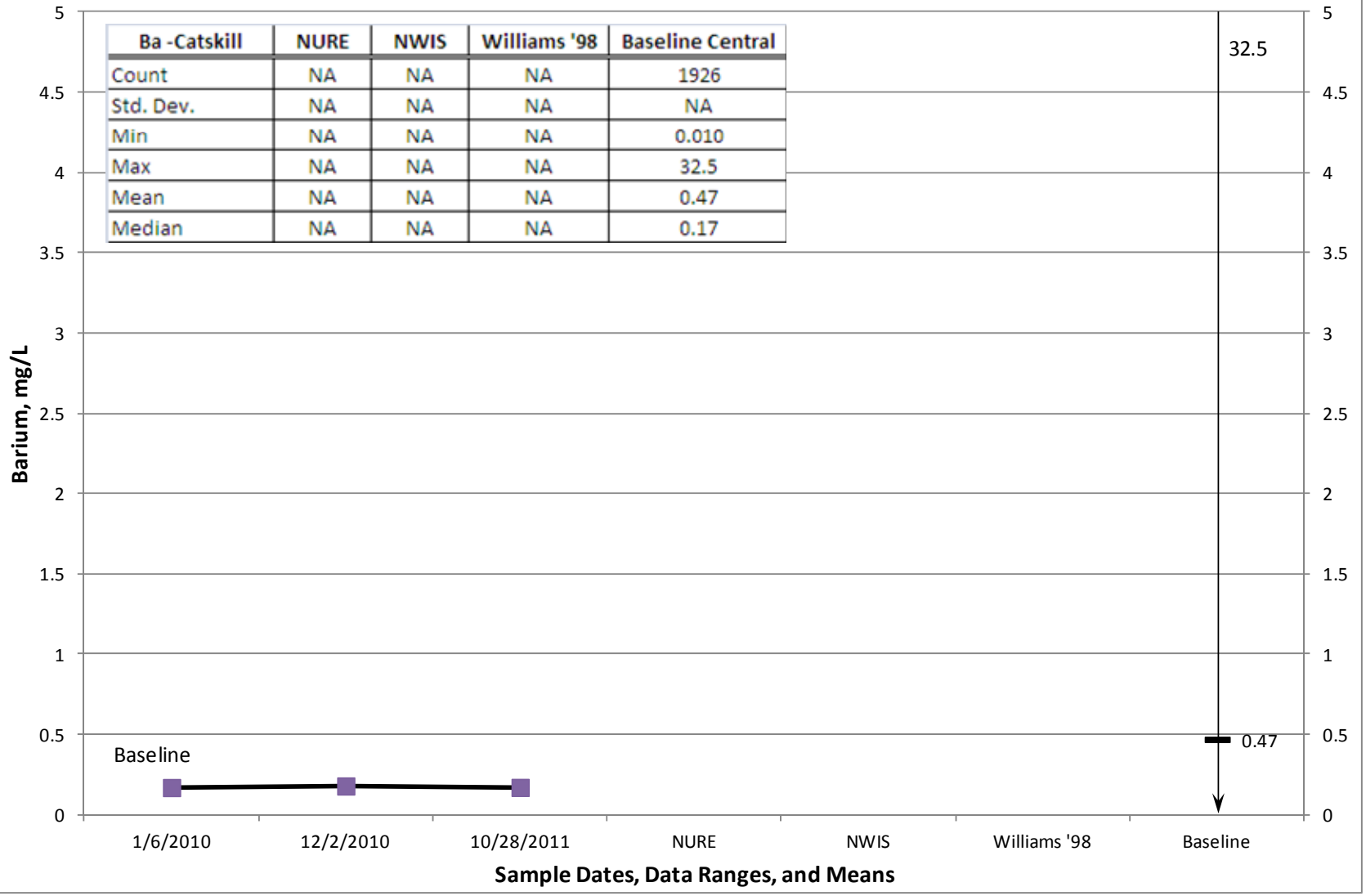



Property Owner L Well TDS Concentrations vs. Time
Compared to NURE, NWIS, Williams '98, and Baseline Data
TDS - Lock Haven | NURE | NWIS | Williams '98 | Baseline Central
Count | NA | 65 | 20 | 1961
Std. Dev. | NA | 1504 | 120 | NA
Min | NA | 134 | 142 | 17
Max | NA | 9200 | 512 | 5410
Mean | NA | 676 | 275 | 223
Median | NA | 246 | 227 | 195
9200
5410
676
275
223
Baseline
1000
900
800
700
600
500
400
300
200
100
0
TDS, mg/L
4/18/2010
11/3/2011
NURE
NWIS
Williams '98
Baseline
Sample Dates, Data Ranges, and Means

APPENDIX D-15
TIME PLOTS
PROPERTY OWNER M

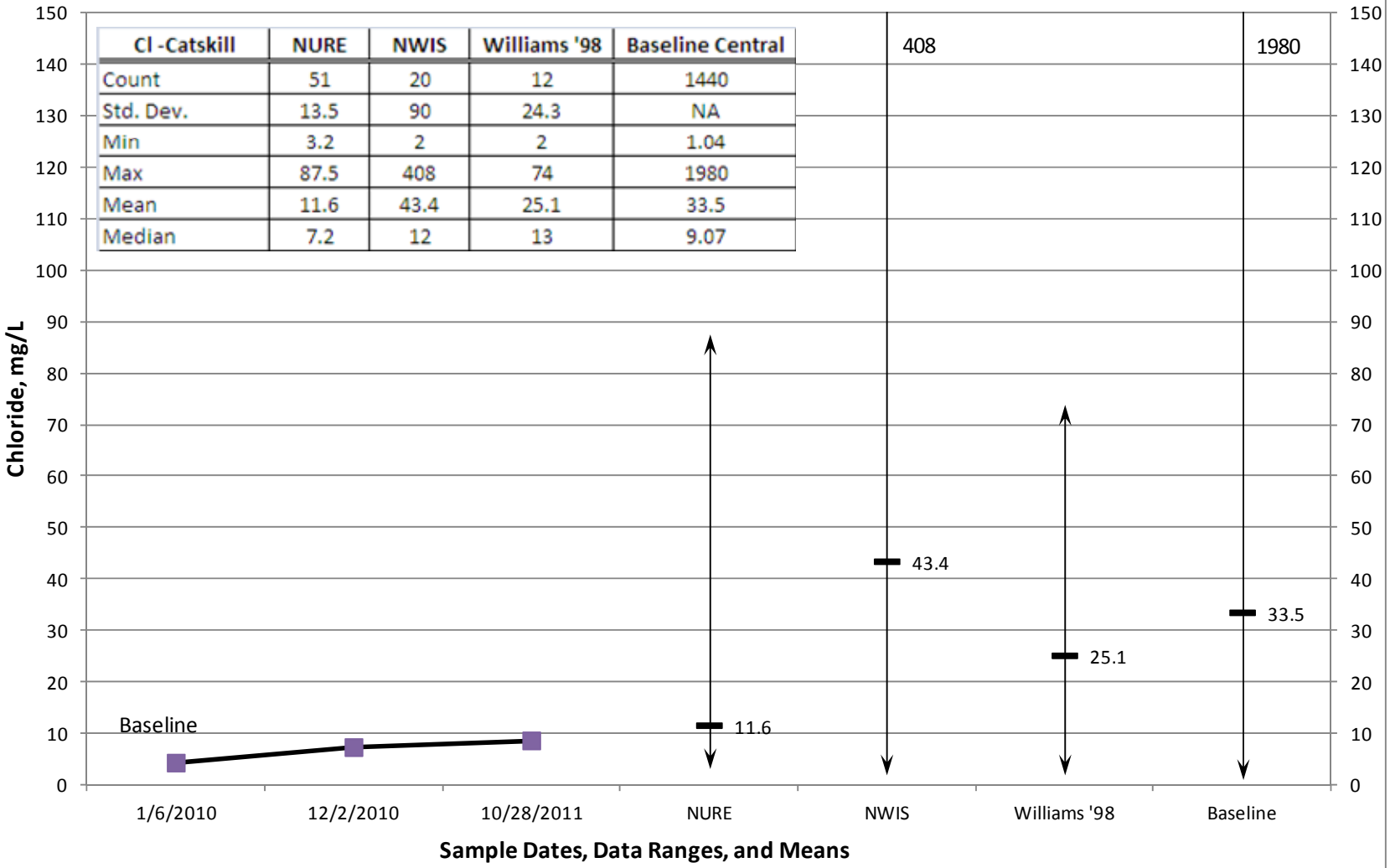
Property Owner M Well Barium Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

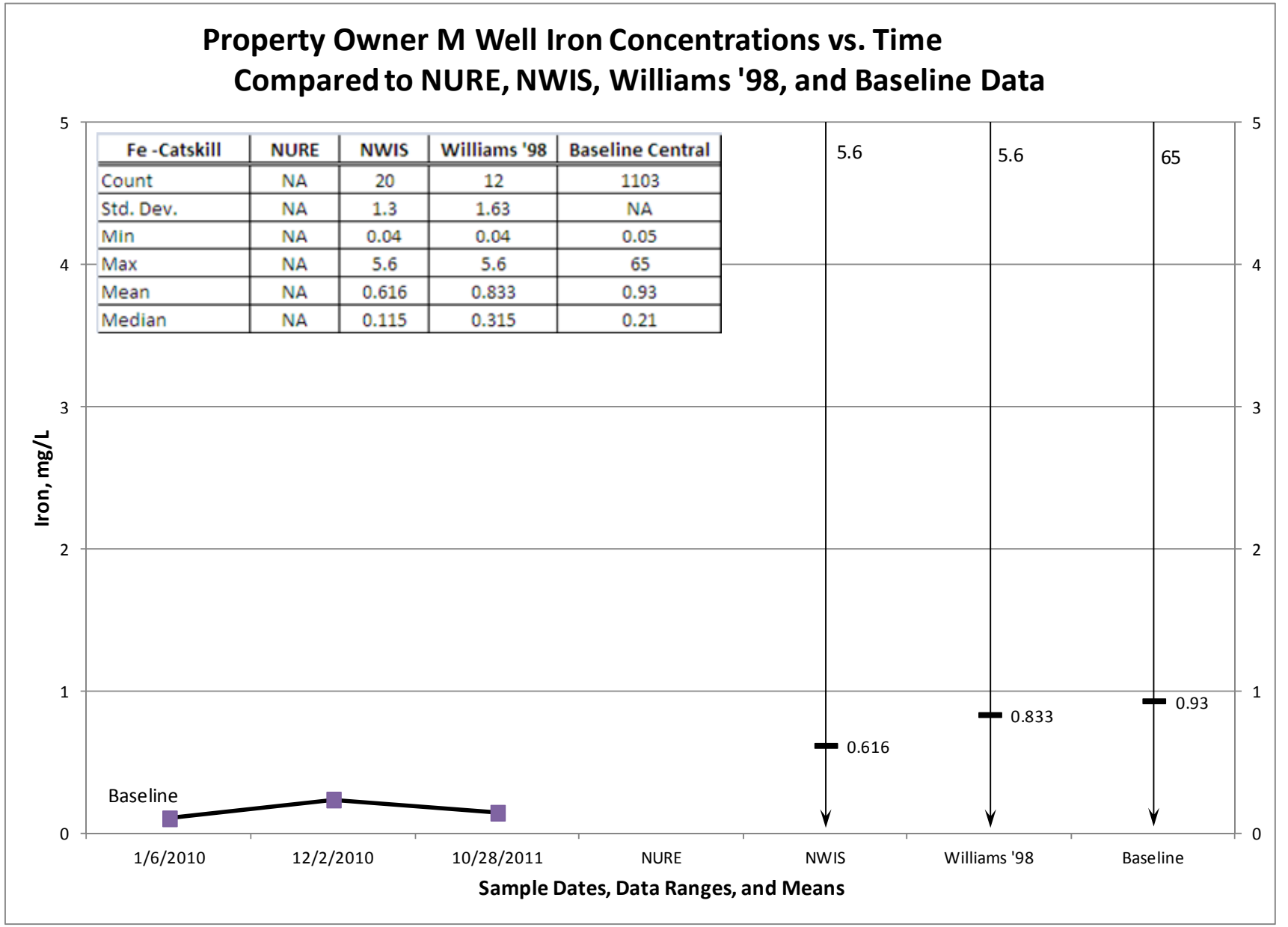
Ba -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	NA	NA	NA	1926
Std. Dev.	NA	NA	NA	NA
Min	NA	NA	NA	0.010
Max	NA	NA	NA	32.5
Mean	NA	NA	NA	0.47
Median	NA	NA	NA	0.17



Property Owner M Well Chloride Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

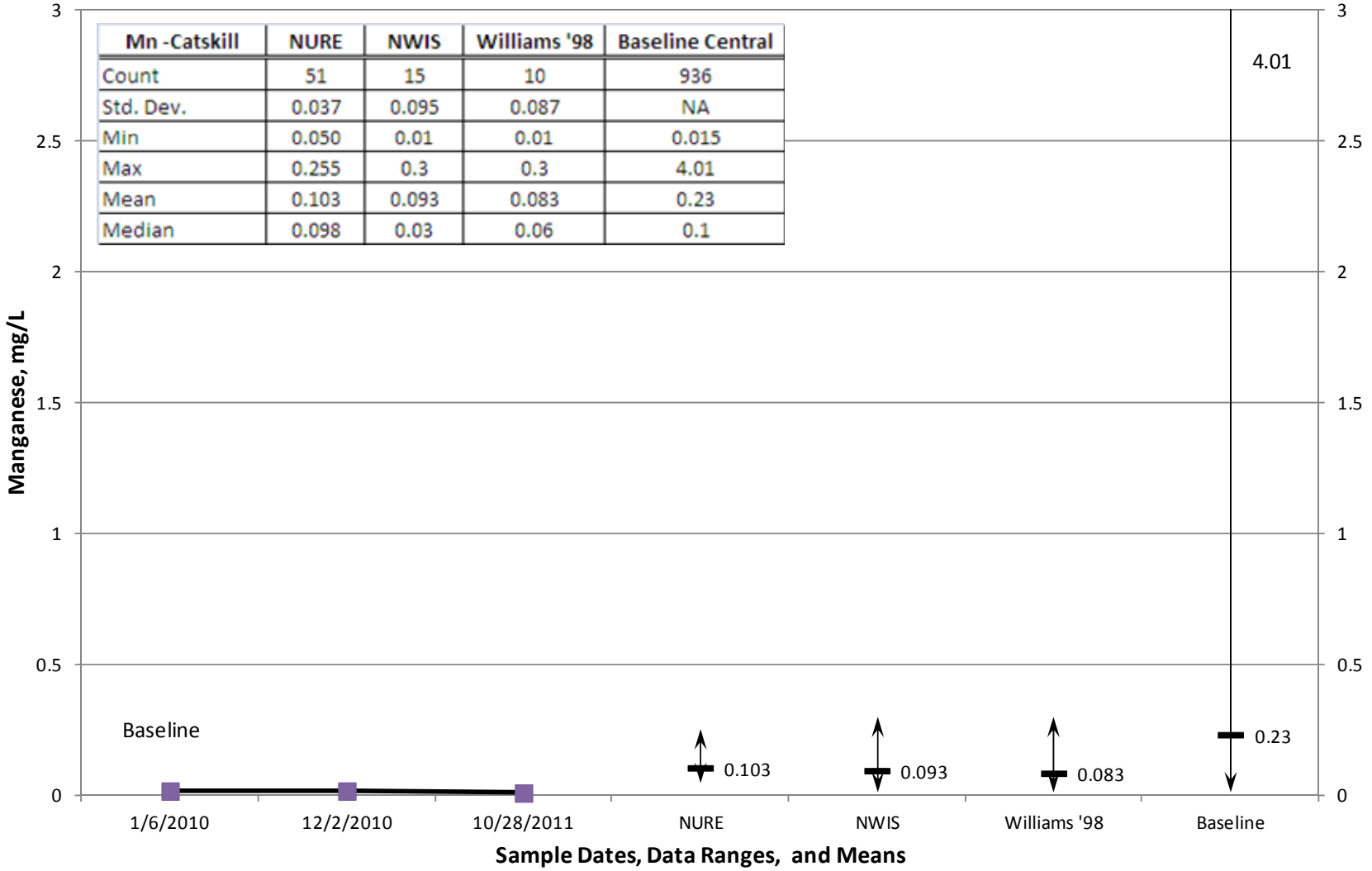
Cl -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	51	20	12	1440
Std. Dev.	13.5	90	24.3	NA
Min	3.2	2	2	1.04
Max	87.5	408	74	1980
Mean	11.6	43.4	25.1	33.5
Median	7.2	12	13	9.07




Property Owner M Well Iron Concentrations vs. Time
Compared to NURE, NWIS, Williams '98, and Baseline Data
Fe -Catskill | NURE | NWIS | Williams '98 | Baseline Central
Count | NA | 20 | 12 | 1103
Std. Dev. | NA | 1.3 | 1.63 | NA
Min | NA | 0.04 | 0.04 | 0.05
Max | NA | 5.6 | 5.6 | 65
Mean | NA | 0.616 | 0.833 | 0.93
Median | NA | 0.115 | 0.315 | 0.21
5.6
5.6
65
0.616
0.833
0.93
Baseline
Iron, mg/L
0
1
2
3
4
5
1/6/2010
12/2/2010
10/28/2011
NURE
NWIS
Williams '98
Baseline
Sample Dates, Data Ranges, and Means

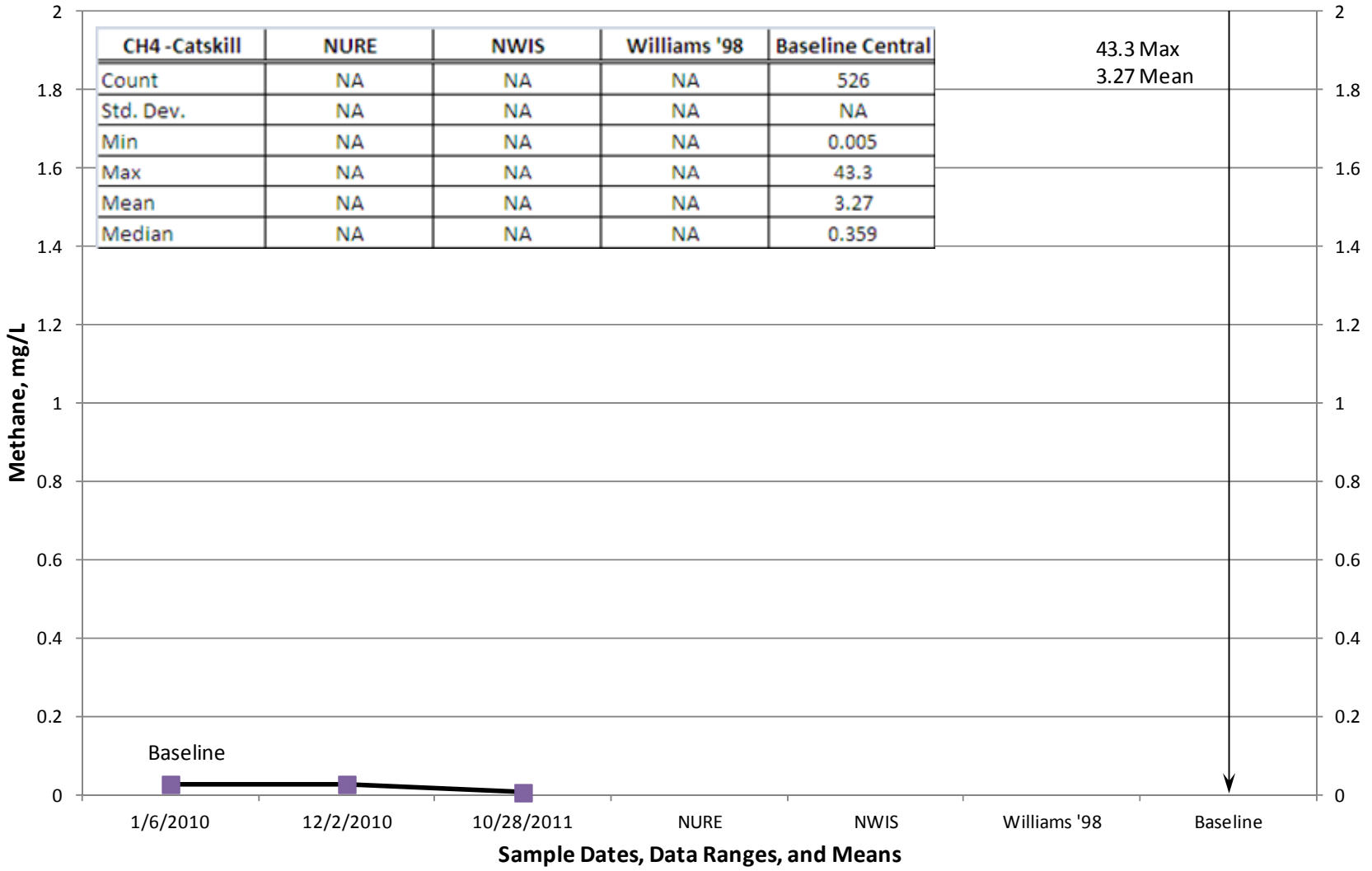
Property Owner M Well Manganese Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

Mn -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	51	15	10	936
Std. Dev.	0.037	0.095	0.087	NA
Min	0.050	0.01	0.01	0.015
Max	0.255	0.3	0.3	4.01
Mean	0.103	0.093	0.083	0.23
Median	0.098	0.03	0.06	0.1

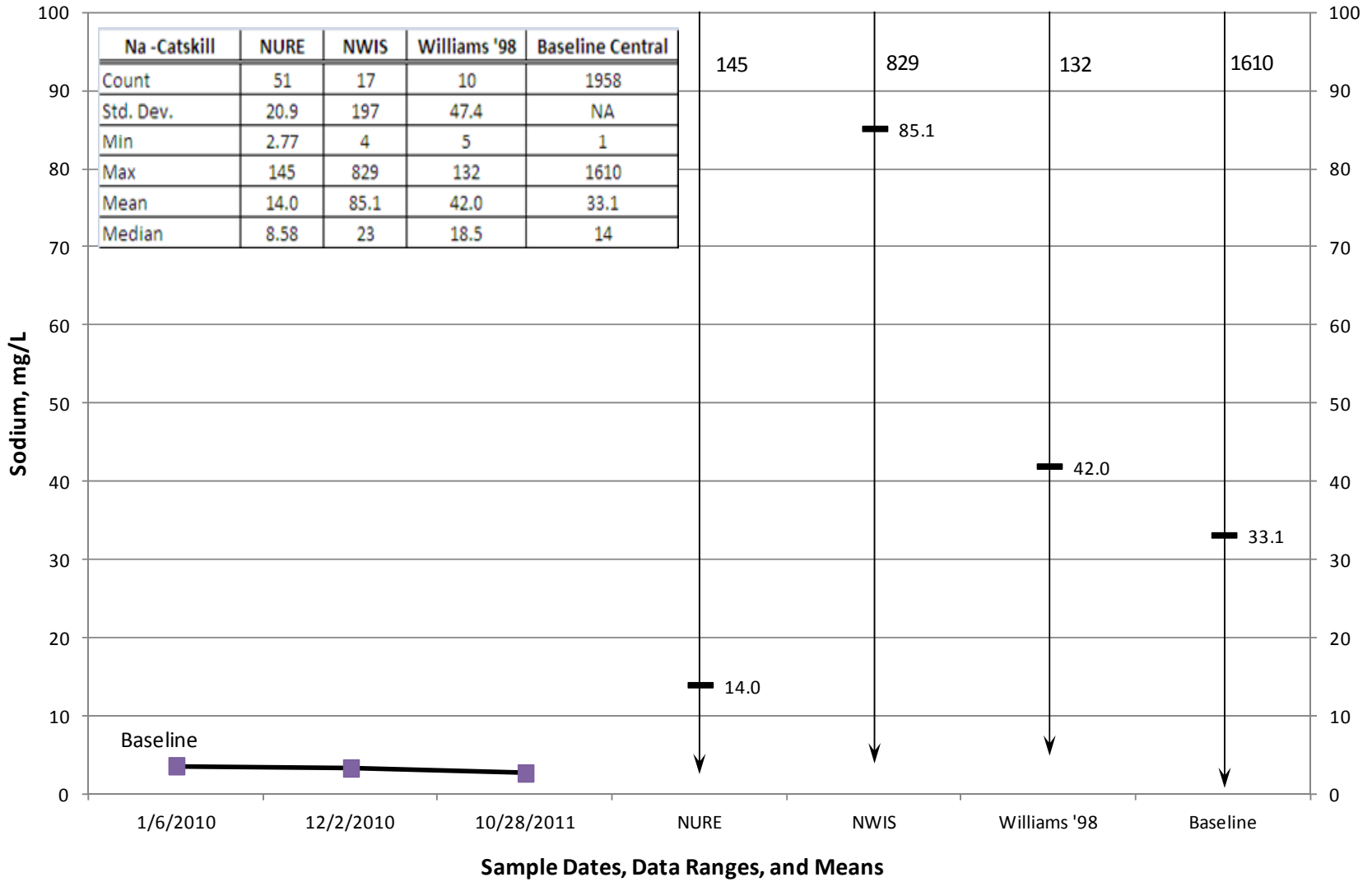


Property Owner M Well Methane Concentrations vs. Time Compared to NURE, NWIS Data, Williams '98, and Baseline Data

CH4 -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	NA	NA	NA	526
Std. Dev.	NA	NA	NA	NA
Min	NA	NA	NA	0.005
Max	NA	NA	NA	43.3
Mean	NA	NA	NA	3.27
Median	NA	NA	NA	0.359



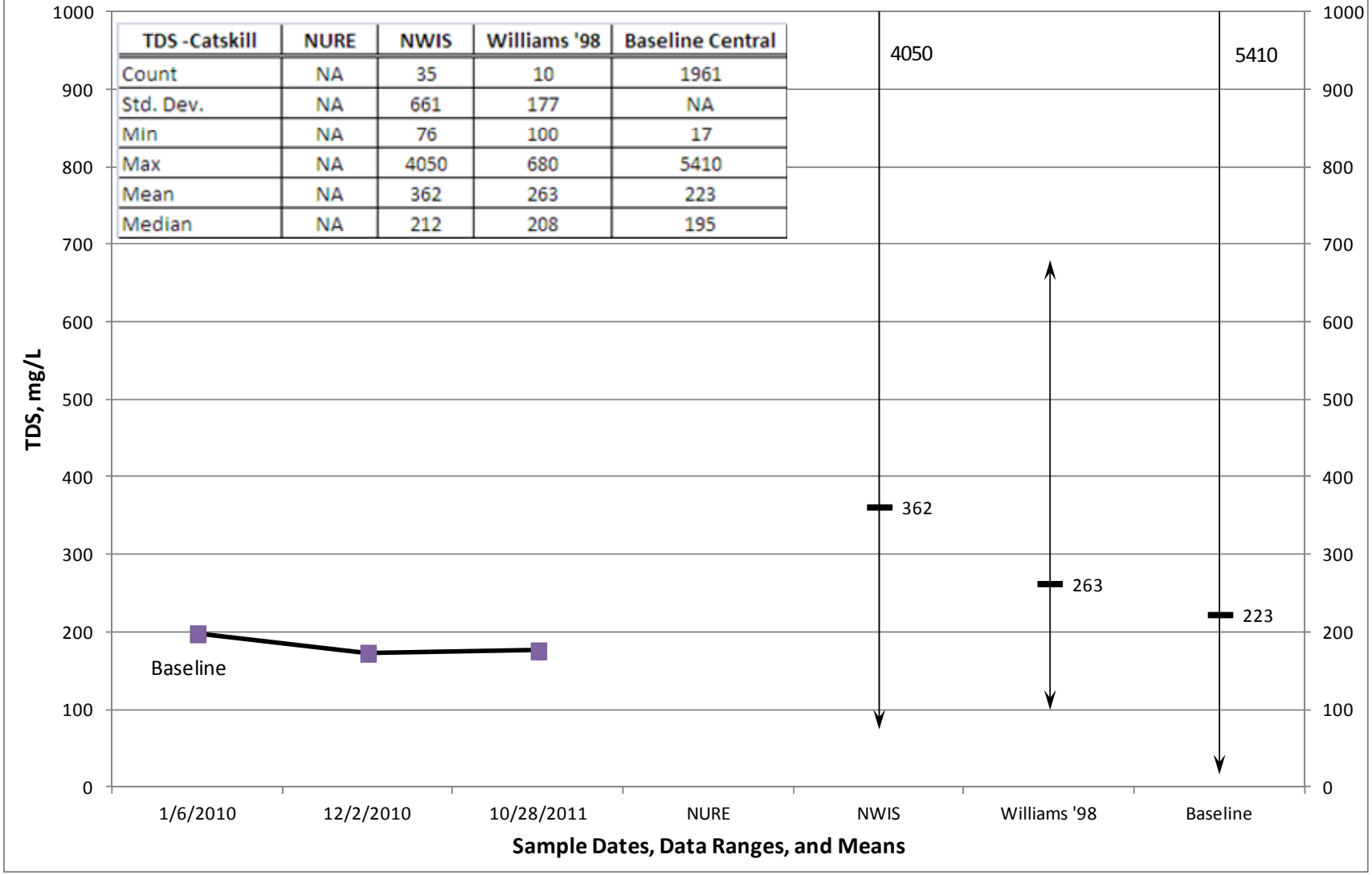
Property Owner M Well Sodium Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data



Na -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	51	17	10	1958
Std. Dev.	20.9	197	47.4	NA
Min	2.77	4	5	1
Max	145	829	132	1610
Mean	14.0	85.1	42.0	33.1
Median	8.58	23	18.5	14

Property Owner M Well TDS Concentrations vs. Time Compared to NURE, NWIS, Williams '98, and Baseline Data

TDS -Catskill	NURE	NWIS	Williams '98	Baseline Central
Count	NA	35	10	1961
Std. Dev.	NA	661	177	NA
Min	NA	76	100	17
Max	NA	4050	680	5410
Mean	NA	362	263	223
Median	NA	212	208	195



APPENDIX E
SCREENING CRITERIA

Table E-1

Summary of Inorganic Parameters in Chesapeake Energy Split Samples from the EPA Retrospective Study Wells that Exceed the Most Stringent of the Applicable Screening Levels

ITEM	Date	Aluminum (mg/L)	Arsenic (mg/L)	Chloride (mg/L)	Iron (mg/L)	Lead (mg/L)	Lithium (mg/L)	Manganese (mg/L)	pH (pH units)	TDS (mg/L)	Turbidity NTU	Total Coliform # positives/mo
SCREENING LEVELS	**PADEP Act 2***	-	0.01	-	-	0.005	0.073	0.3	-	-	-	-
	EPA MCLs	-	0.01	-	-	0.015***	-	-	-	-	5	1
	EPA SMCLs	0.2	-	250	0.3	-	-	0.05	6.5-8.5	500	-	-
	EPA Regional**	15.5	0.000045	-	10.9	-	0.031	0.322	-	-	-	-
WELLS & SPRING (well depth)												
Property Owner A (300-ft)	10/13/2010	NA	0.01		6.19	<0.005 U		0.369			33	NA
	7/18/2011				0.786 (<0.05 U D)			0.912 (0.788 D)			36	
	11/4/2011	1.44, 6.26 (0.0566 D)	0.0122 (0.00416 D)		3.88, 14.5 (0.0845 D)	0.0353, 0.0377 (<0.002 U D)		1.15, 1.34 (0.959 D, 1.02 D, 1.03 D)			865	Present
Property Owner B (spring)	**10/14/2010 (baseline)**								**6.3**			**NA**
	11/4/2011								6.1			Present
Property Owner C (260-ft)	**4/29/2011 (baseline)**	**NA**	**<0.01 U**	**413**	**0.285**					**842**		
	10/27/2011	0.262 (<0.02 U D)	0.00746 (0.00456 D)	351	0.368 (<0.05 U D)					726		
Property Owner D (250-ft)	**1/10/2010 (baseline)**								**8.2**			**NA**
	6/10/2011								8.8			
	10/28/2011											Present
Property Owner E (115-ft)	**4/1/2010 (baseline)**							**0.118**				
	8/12/2010							0.127				
	1/8/2011							0.133				
	11/4/2011							0.116 (0.113 D)				
Property Owner E (185-ft)	**4/1/2010 (baseline)**							**0.0647**				
	8/12/2010							0.0788				
Property Owner F (200-ft)	3/10/2011						NA					
	11/11/2011						0.1					
Property Owner G (unknown)	**4/2/2010 (baseline)**				**0.281**	**<0.005 U**		**<0.015 U**			**<1 U**	**NA**
	10/1/2010				10.6			0.153				
	11/10/2010				3.58 (< 0.05 U D)			0.123 (< 0.015 D)			24	
	6/28/2011				2.68						91.2	
	9/1/2011				3.08 (0.109 D)						16.1	
	10/13/2011 (pre-treatment)				4.13 (0.0549 D)	0.0061					37.1	
	10/13/2011 (post-treatment)											
	10/27/2011				0.343 (<0.05 U D)						13	Present
Property Owner H (340-ft)	**4/1/2010 (baseline)**	**NA**			**0.0546**	**<0.005 U**		**<0.015 U**			**2**	**NA**
	10/1/2010				2.54 (<0.05 U D)			0.214			31.2	
	11/10/2010				0.982 (<0.05 U D)	0.0089 (<0.005 U D)		0.0607 (0.0213 D)			26.4	
	12/2/2010				0.829			0.095			11.7	
	3/1/2011 (pre-treatment)					0.0076						
	3/1/2011 (post-treatment)											
	5/10/2011 (pre-treatment)					0.0738					7.3	
	5/10/2011 (post-treatment)											
	10/28/2011	0.322 (<0.02 U D)									6.8	Present
	11/8/2011 (post-treatment)											
Property Owner I (142-ft)	8/3/2010								6.4 J			NA
	10/31/2011								6.4			Present
Property Owner I (203-ft)	**9/14/2010 (baseline)**	**NA**			**2.29 J (<0.05 U D)**	**<0.005 U**		**0.0429 (0.0214 D)**			**68**	
	11/18/2010				0.434 (0.148 D)							
	3/1/2011 (pre-treatment)				2.18			0.145			5.1	
	3/1/2011 (post-treatment)										7.2	
	4/7/2011 (pre-treatment)				1.05	0.0075		0.0992			12.2	
	4/7/2011 (post-treatment)					0.0051						
	5/23/2011 (pre-treatment)										6.6	
	5/23/2011 (post-treatment)							0.0662				
	10/31/2011	0.31, 0.112 (<0.02 U D)									5.4	
Property Owner J (unkown)	**7/2/2010 (baseline)**				**0.676**	**0.0114**		**0.249**			**5.7**	
	2/8/2011				0.888	0.009		0.29			9.8	
	11/3/2011				0.583 (0.316 D)			0.22 (0.216 D)				

Table E-1

Summary of Inorganic Parameters in Chesapeake Energy Split Samples from the EPA Retrospective Study Wells that Exceed the Most Stringent of the Applicable Screening Levels

ITEM	Date	Aluminum (mg/L)	Arsenic (mg/L)	Chloride (mg/L)	Iron (mg/L)	Lead (mg/L)	Lithium (mg/L)	Manganese (mg/L)	pH (pH units)	TDS (mg/L)	Turbidity NTU	Total Coliform # positives/mo
SCREENING LEVELS	**PADEP Act 2***	-	0.01	-	-	0.005	0.073	0.3	-	-	-	-
	EPA MCLs	-	0.01	-	-	0.015***	-	-	-	-	5	1
	EPA SMCLs	0.2	-	250	0.3	-	-	0.05	6.5-8.5	500	-	-
	EPA Regional**	15.5	0.000045	-	10.9	-	0.031	0.322	-	-	-	-
WELLS & SPRING (well depth)												
Property Owner K (175-ft)	**1/7/2010 (baseline)**							**0.0321**				
	5/31/2011 (post-treatment)							0.102				
	10/27/2011							0.168 (0.119 D)				Present
Property Owner L (225-ft)	**4/18/2010 (baseline)**											**NA**
	11/3/2011											Present
Property Owner M (440-ft)	**1/6/2010 (baseline)**					**<0.005 U**						**NA**
	12/2/2010					0.011						
	4/11/2011					0.0124						
	10/28/2011											Present

*Residential used Wells <2,500 mg/l TDS
** Screening Levels for Tap Water (chronic)
*** Action Level
NA = Not Analyzed
U = Less Than Detection Limit
D = Dissolved (all metals are total unless marked with D)
mg/L = Milligrams per Liter
NTU = Nephelometric Turbidity Units

Table E-2

Summary of Organic Parameters Detected in Chesapeake Energy Split Samples from the EPA Retrospective Study Wells Compared to Applicable Screening Levels

ITEM	Date	Diethylene Glycol	Tetraethylene Glycol	Triethylene Glycol	Squalene	Toluene
		(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
SCREENING LEVELS	**PADEP Act 2***	-	-	-	-	1000
	EPA MCLs	-	-	-	-	1000
	EPA SMCLs	-	-	-	-	-
	EPA Regional**	-	-	-	-	856
WELLS & SPRING (well depth)						
Property Owner A (300-ft)	10/13/2010				NA	100
	11/4/2011				6 J	
Property Owner B (spring)						
Property Owner C (260-ft)						
Property Owner D (250-ft)						
Property Owner E (115-ft)	**4/1/2010 (baseline)**	**NA**	**NA**	**NA**		
	11/4/2011	13 JB	26 JB	20 JB		
Property Owner E (185-ft)						
Property Owner F (200-ft)	3/10/2011		NA			
	10/25/2011		11 J			
Property Owner G (unknown)						
Property Owner H (340-ft)	**4/1/2010 (baseline)**		**NA**	**NA**		**<0.5 U**
	11/10/2010					1.13
	10/28/2011		20 J	12 J		
Property Owner I (142-ft)						
Property Owner I (203-ft)	**9/14/2010 (baseline)**					**<0.5 U**
	3/1/2011 (pre-treatment)					1.71
	4/7/2011 (pre-treatment)					0.95
Property Owner J (unkown)						
Property Owner K (175-ft)						
Property Owner L (225-ft)	**4/18/2010 (baseline)**		**NA**			
	11/3/2011		15 JB			
Property Owner M (440-ft)						

*Residential used Wells <2,500 mg/l TDS

** Screening Levels for Tap Water (chronic)

NA = Not Analyzed

U = Less Than Detection Limit

J = Estimated Value

B = Blank Contained Analyte

ug/L = Micrograms per Liter

Table E- 3

Summary of Dissolved Gases Detected in Chesapeake Energy Split Samples from the EPA Retrospective Study Wells

ITEM	Date	Ethane (mg/L)	Methane (mg/L)	Propane (mg/L)
WELLS & SPRING (well depth)				
Property Owner A (300-ft)	10/13/2010	0.192	8.36	
	7/18/2011	0.0861	5.21	
	8/4/2011	0.0904	4.82	
	8/18/2011	0.0964	4.95	
	9/1/2011	0.0556	1.51	
	11/4/2011	0.0117	1.86	
Property Owner B (spring)				
Property Owner C (260-ft)	**4/29/2011 (baseline)**		**21.5**	
	10/27/2011		22.5	
Property Owner D (250-ft)	**1/10/2010 (baseline)**		**3.55**	
	6/10/2011		4.81	
	10/28/2011		2.11 J	
Property Owner E (115-ft)	**4/1/2010 (baseline)**	**0.049**	**33.8**	
	8/12/2010	0.0495	34.7	
	1/8/2011	0.0838	35.8	
	11/4/2011	0.0816	37.1 J	
Property Owner E (185-ft)	**4/1/2010 (baseline)**		**8.88**	
	8/12/2010		9.68	
	1/8/2011		0.239	
	11/4/2011		0.609	
Property Owner F (200-ft)	3/10/2011	< 0.026 U	53.4	
	10/25/2011	0.0202	55.3	
	11/11/2011	0.202	51.8	
Property Owner G (unknown)	**4/2/2010 (baseline)**		**0.035**	
	9/1/2011		0.0126	
Property Owner H (340-ft)	**4/1/2010 (baseline)**		**0.045**	
	9/13/2010		0.0535	
	11/10/2010		0.183	
	10/28/2011		0.00607	
	11/8/2011 (pre-treatment)		0.0655	
	11/8/2011 (post-treatment)		0.0258	
Property Owner I (142-ft)	8/3/2010	< 0.0260 U	0.0957	
	9/15/2010	0.0953	1.41	
	10/6/2010	0.195	2.78 J	
	10/20/2010	0.103	1.78	

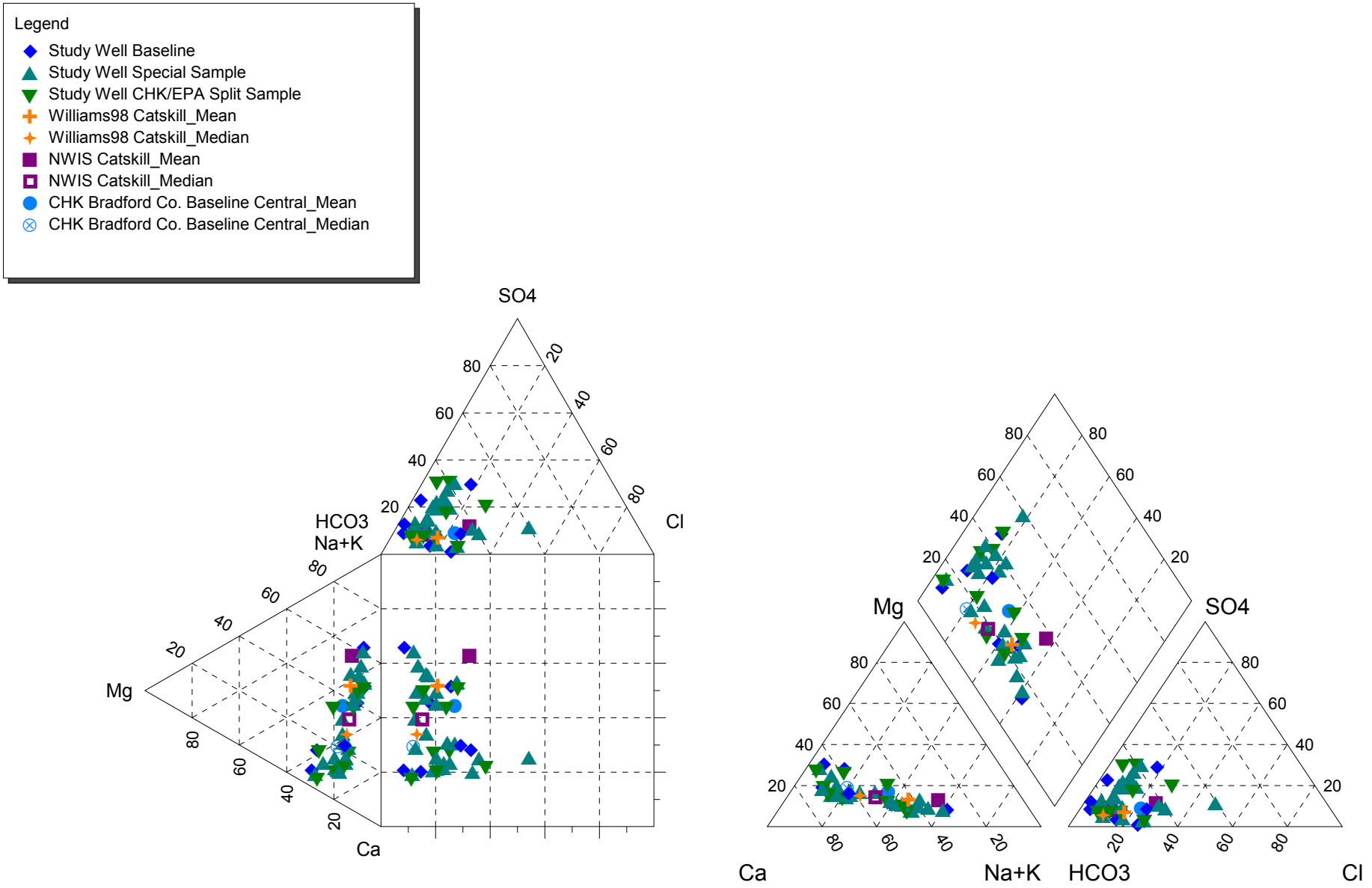
Table E- 3

Summary of Dissolved Gases Detected in Chesapeake Energy Split Samples from the EPA Retrospective Study Wells

ITEM	Date	Ethane (mg/L)	Methane (mg/L)	Propane (mg/L)
WELLS & SPRING (well depth)				
Property Owner I (203-ft)	**9/14/2010 (baseline)**	**1.59**	**10.9**	**0.101**
	10/6/2010	1.84	25.4	0.117
	10/13/2010	1.47	20.6	0.0841
	10/13/2010 (pre-treatment)	0.254	4.58	
	10/20/2010	0.754	8.82	0.0388
	11/18/2010	0.593	7.47	
	3/1/2011 (pre-treatment)	0.959 J	17.1	
	3/1/2011 (post-treatment)		1.76	
	4/7/2011 (pre-treatment)	0.613	14.2	
	4/7/2011 (post-treatment)	0.048	2.82	
	5/23/2011 (pre-treatment)	0.624	9.21	
	5/23/2011 (post-treatment)	0.0625	1.2	
	6/8/2011	0.437	3.09	
	6/22/2011	0.543	10.4	
	7/6/2011	0.6	10.8	
	7/20/2011	0.511	6.65	
	8/3/2011	0.364	10.4	
	8/17/2011	0.421	8.88	
	9/2/2011	0.424	6.23	
	9/14/2011	0.467	9.87 J	
	9/29/2011	0.445	9.62	
	10/12/2011	0.19	4.1	
	10/31/2011	0.402	6.09	
	11/9/2011	0.395	4.94	
	11/22/2011	0.418	5.51	
	12/7/2011	0.118	3.6	
Property Owner J (unkown)				
Property Owner K (175-ft)	**1/7/2010 (baseline)**		**<0.026 U**	
	10/27/2011		0.00674	
Property Owner L (225-ft)	**4/18/2010 (baseline)**		**0.048**	
Property Owner M (440-ft)				

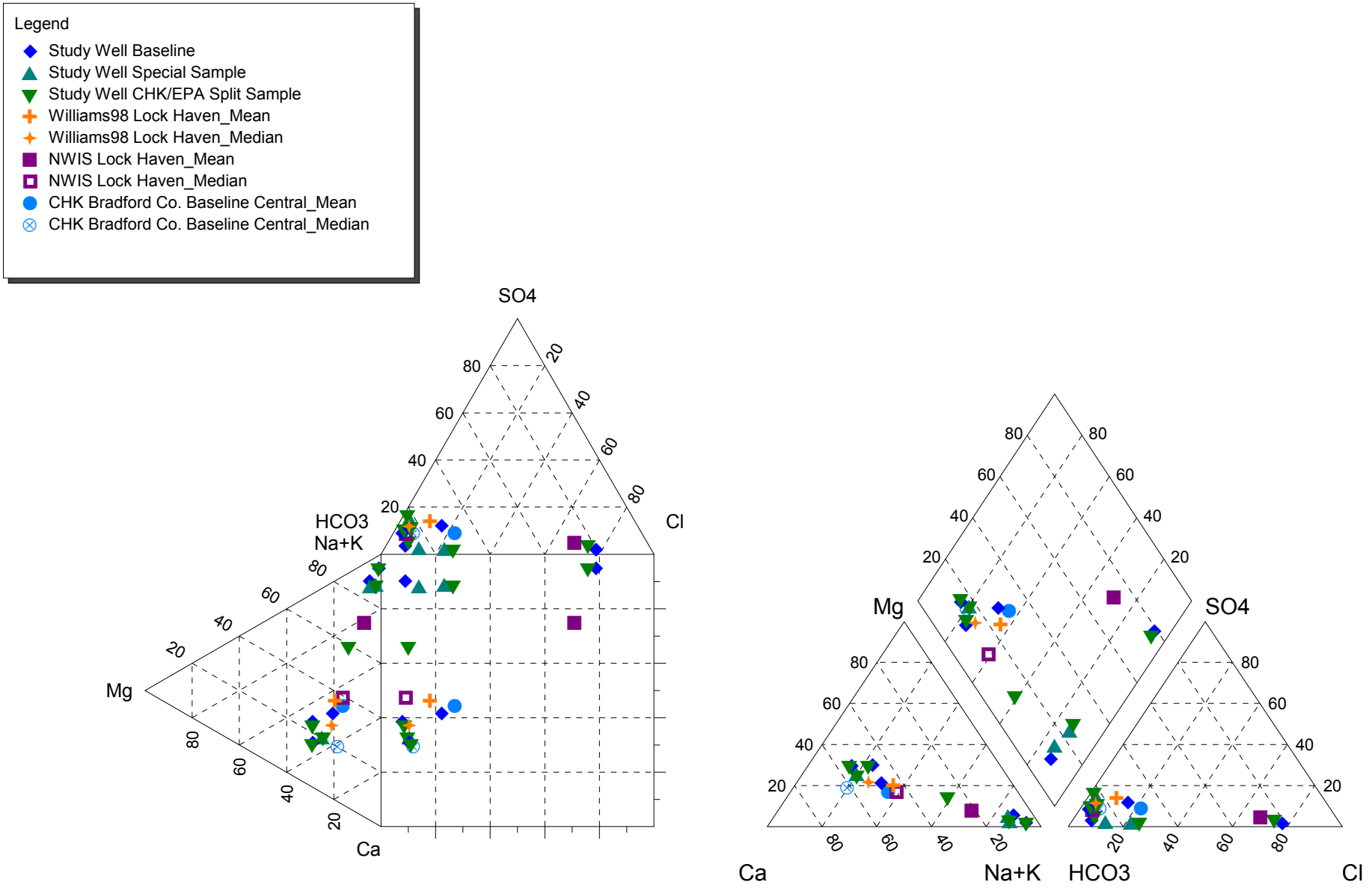
U = Less Than Detection Limit
J = Estimated Value
mg/L = Milligrams per Liter

APPENDIX F
DUROV AND PIPER DIAGRAMS



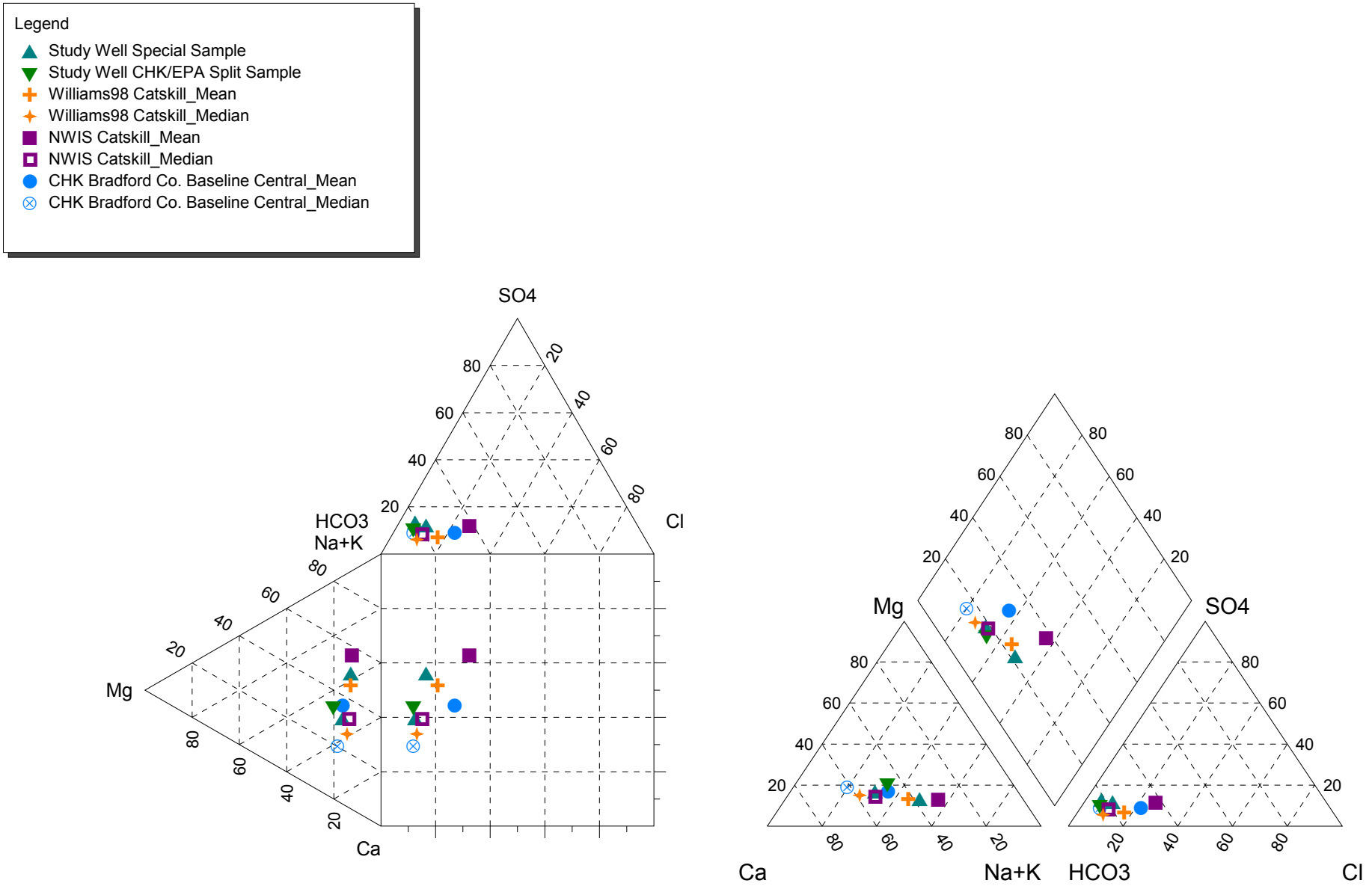
Durov & Piper Diagrams of Catskill Wells Compared to Means/Medians from Bradford Co. Regional Water Quality Databases - Catskill

WESTON SOLUTIONS The Trusted Integrator for Sustainable Solutions	PROJECT: Hydraulic Fracturing Retrospective Study	PROJECT NO: 14610.011.004
	CLIENT: Chesapeake Energy	DATE: March 22, 2012



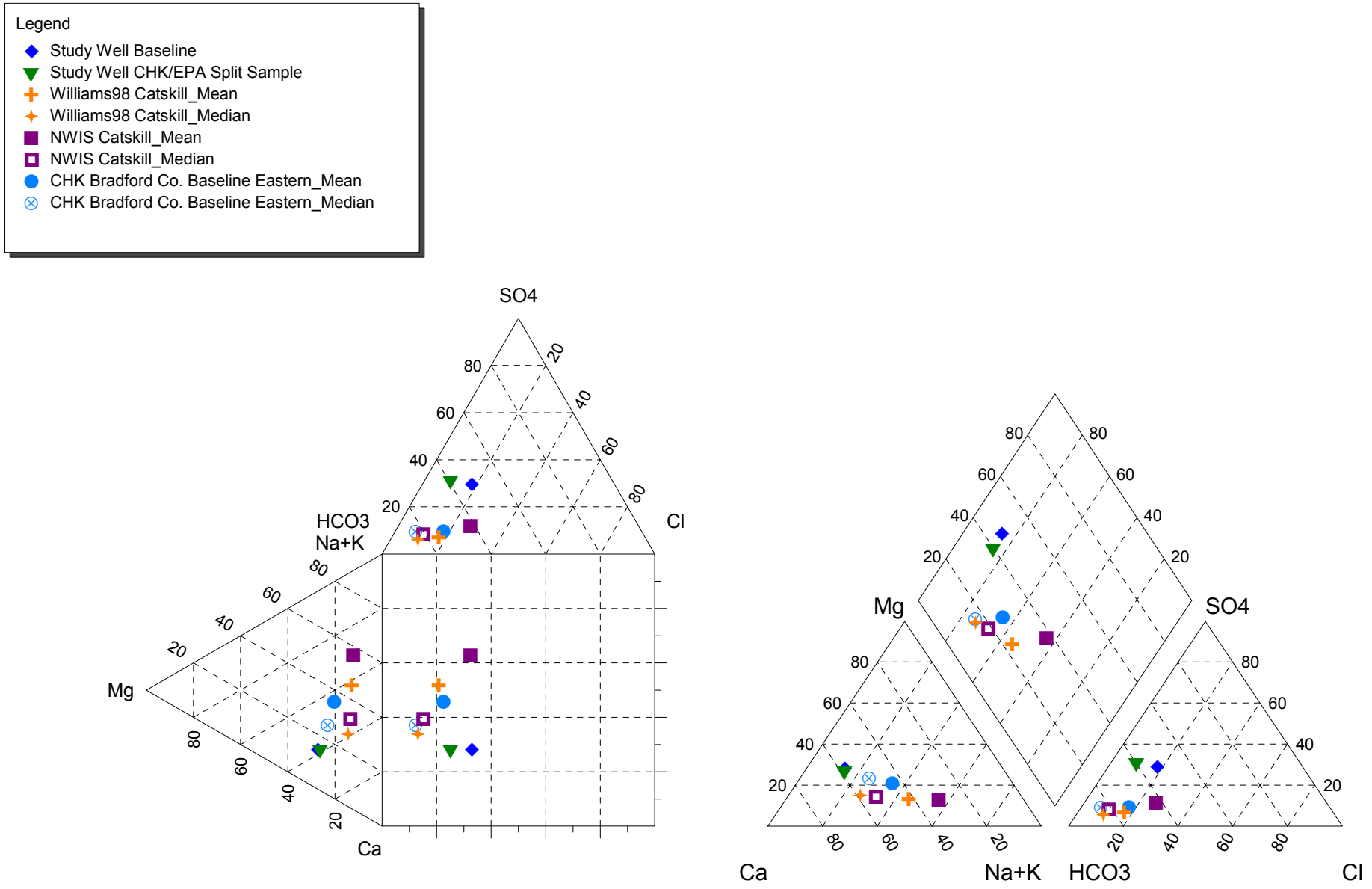
Durov & Piper Diagrams of Lock Haven Wells Compared to Means/Medians from Bradford Co. Regional Water Quality Databases - Lock Haven

WESTON SOLUTIONS The Trusted Integrator for Sustainable Solutions	PROJECT: Hydraulic Fracturing Retrospective Study	PROJECT NO: 14610.011.004
	CLIENT: Chesapeake Energy	DATE: March 22, 2012



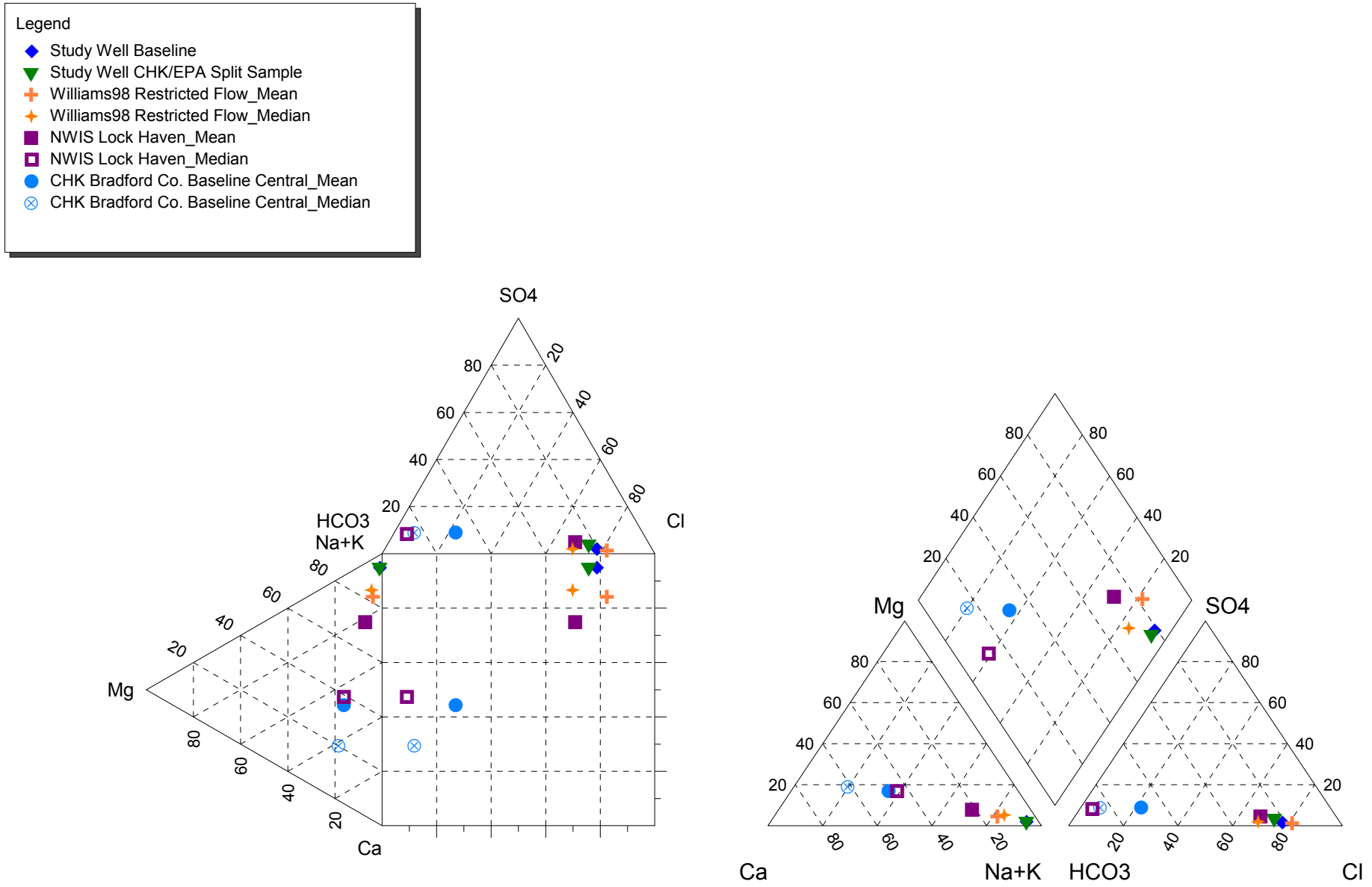
Durov & Piper Diagrams of Property Owner A Well Compared to Means/Medians from Bradford Co. Regional Water Quality Databases - Catskill

WESTON SOLUTIONS The Trusted Integrator for Sustainable Solutions	PROJECT: Hydraulic Fracturing Retrospective Study	PROJECT NO: 14610.011.004
	CLIENT: Chesapeake Energy	DATE: March 22, 2012



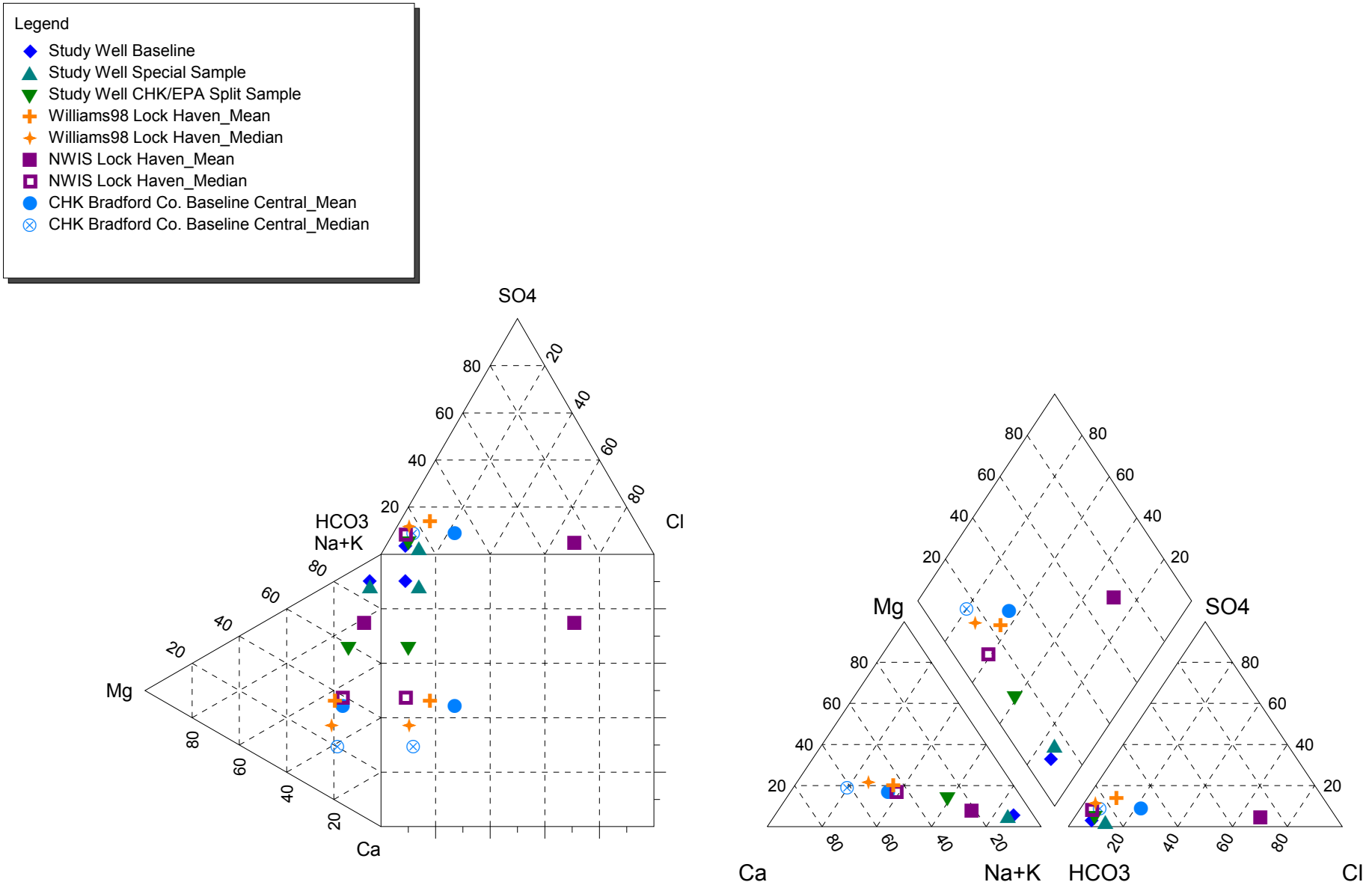
Durov & Piper Diagrams of Property Owner B Spring Compared to Means/Medians from Bradford Co. Regional Water Quality Databases - Catskill

WESTON SOLUTIONS The Trusted Integrator for Sustainable Solutions	PROJECT: Hydraulic Fracturing Retrospective Study	PROJECT NO: 14610.011.004
	CLIENT: Chesapeake Energy	DATE: March 22, 2012



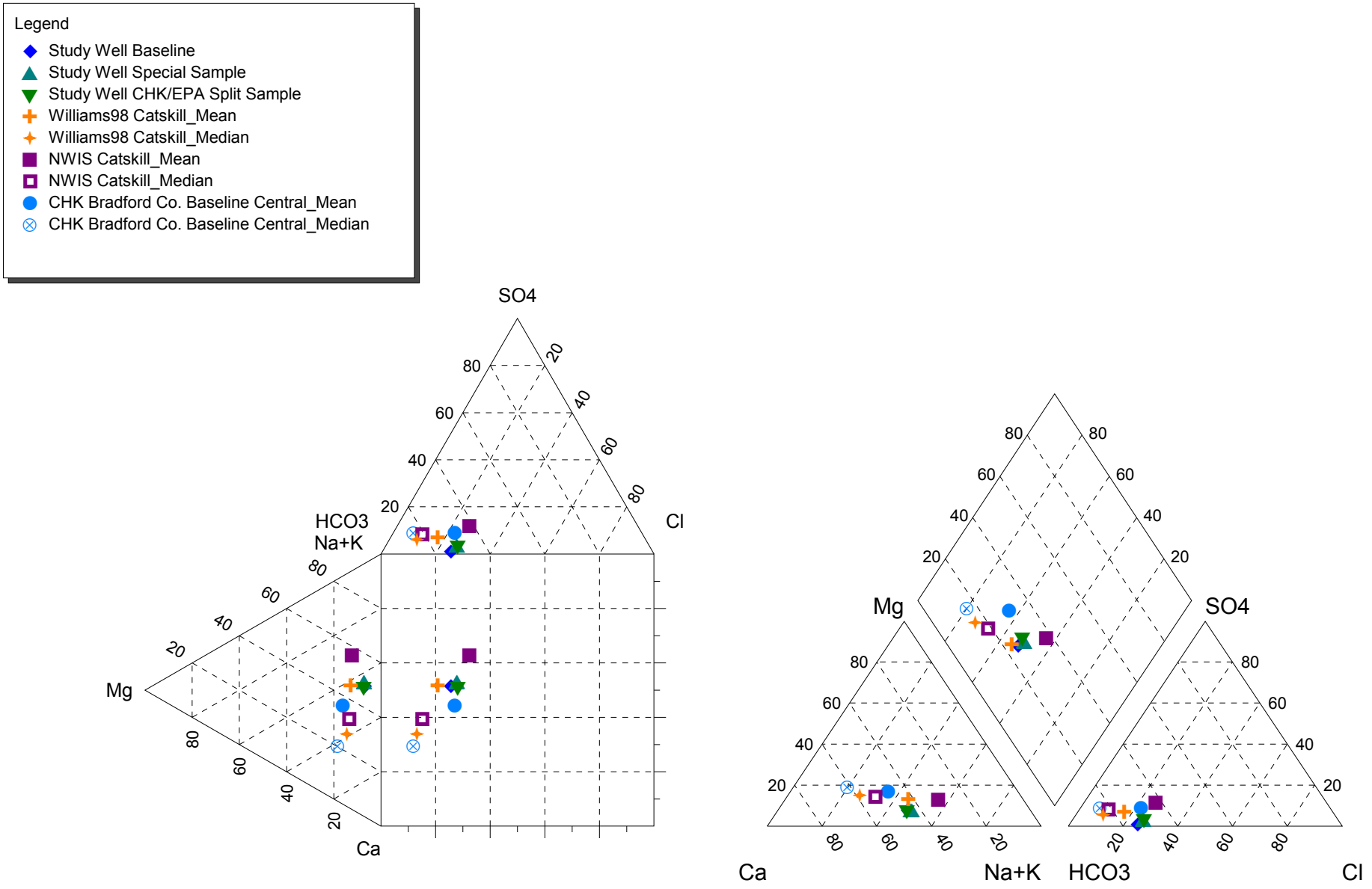
Durov & Piper Diagrams of Property Owner C Well Compared to Means/Medians from Bradford Co. Regional Water Quality Databases - Lock Haven

WESTON SOLUTIONS The Trusted Integrator for Sustainable Solutions	PROJECT: Hydraulic Fracturing Retrospective Study	PROJECT NO: 14610.011.004
	CLIENT: Chesapeake Energy	DATE: March 22, 2012



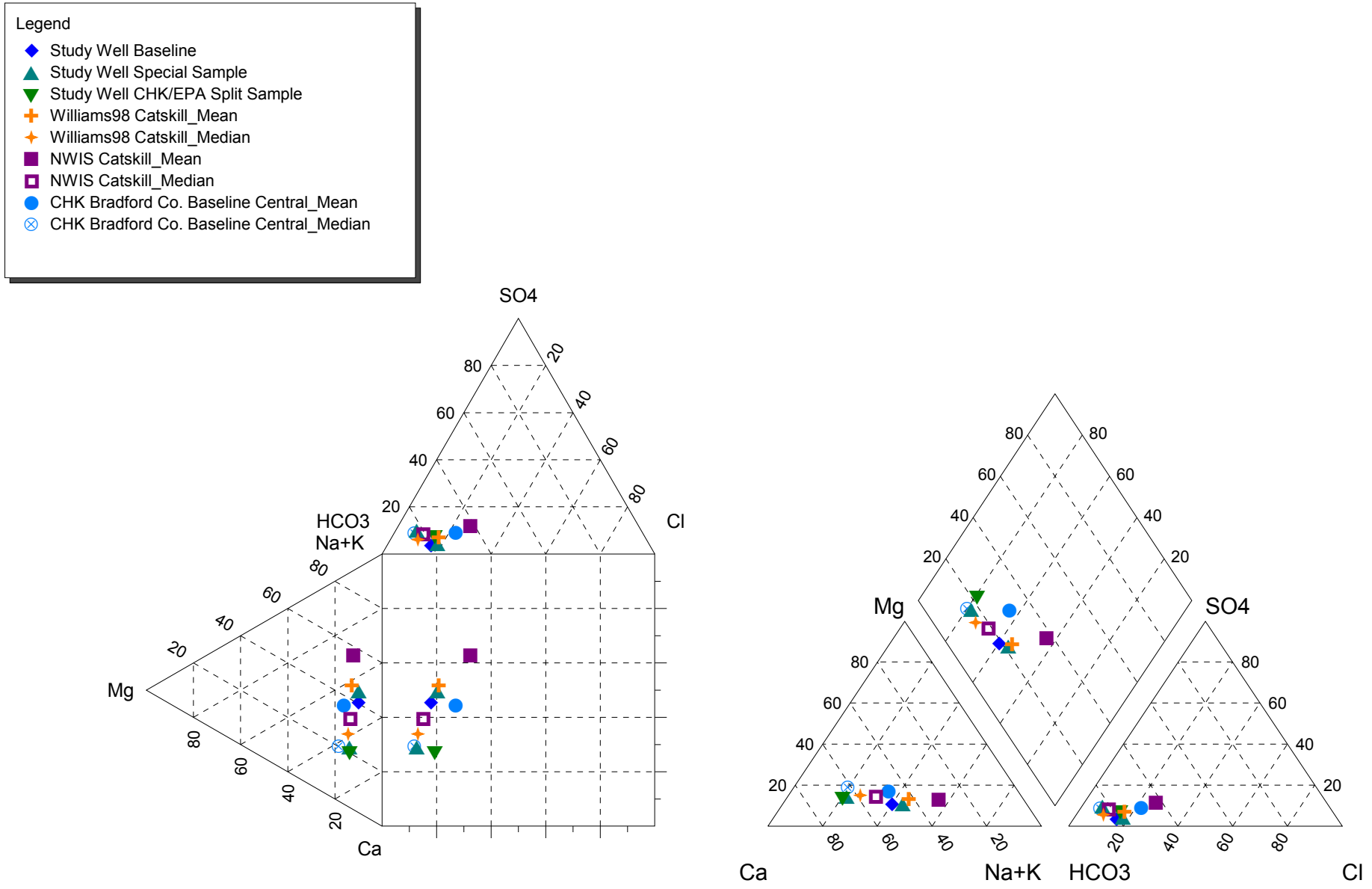
Durov & Piper Diagrams of Property Owner D Well Compared to Means/Medians from Bradford Co. Regional Water Quality Databases - Lock Haven

WESTON SOLUTIONS The Trusted Integrator for Sustainable Solutions	PROJECT: Hydraulic Fracturing Retrospective Study	PROJECT NO: 14610.011.004
	CLIENT: Chesapeake Energy	DATE: March 22, 2012



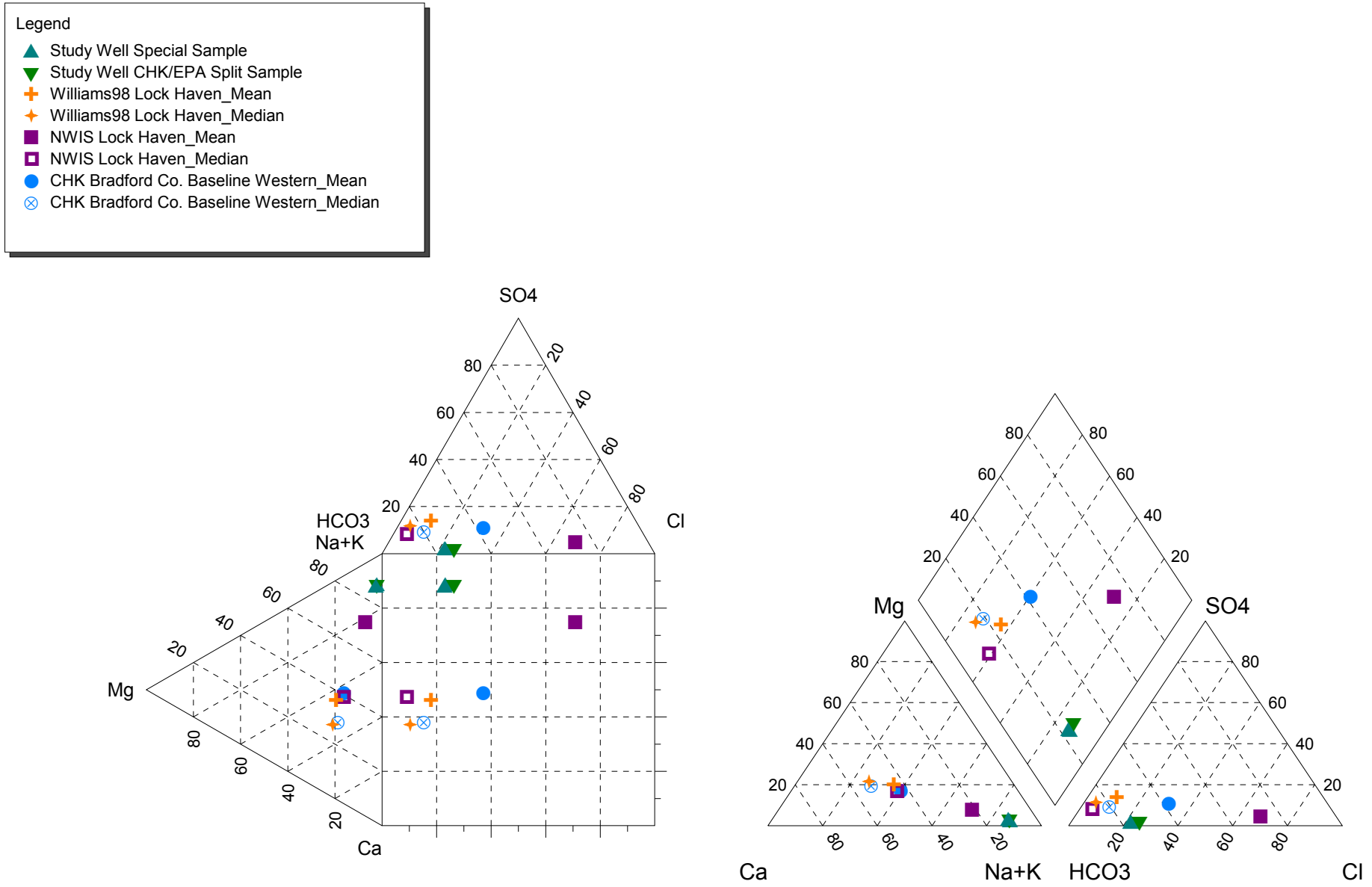
Durov & Piper Diagrams of Property Owner E (115 ft) Well Compared to Means/Medians from Bradford Co. Regional Water Quality Databases - Catskill

WESTON SOLUTIONS The Trusted Integrator for Sustainable Solutions	PROJECT: Hydraulic Fracturing Retrospective Study	PROJECT NO: 14610.011.004
	CLIENT: Chesapeake Energy	DATE: March 22, 2012



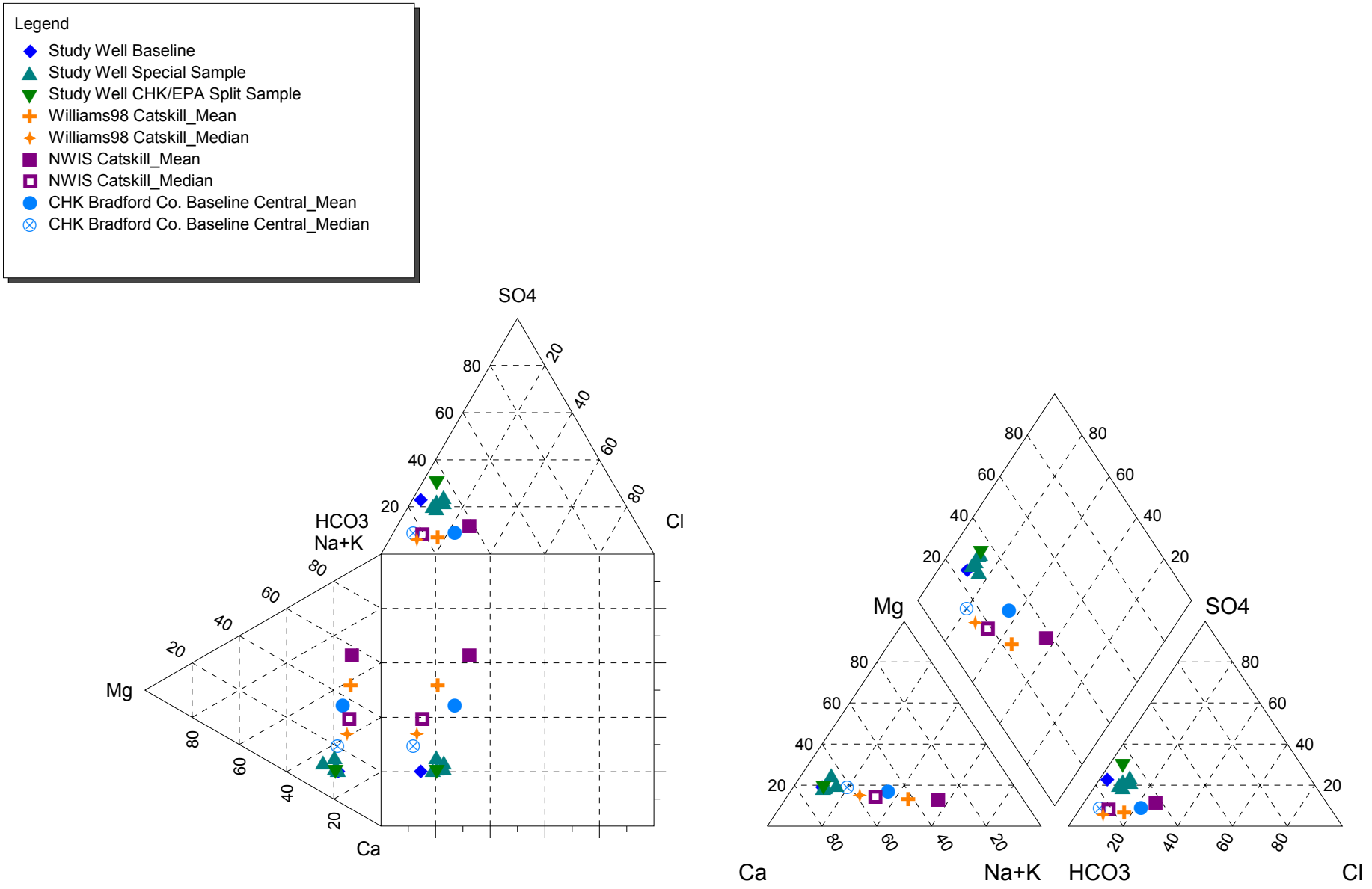
Durov & Piper Diagrams of Property Owner E (185 ft) Well Compared to Means/Medians from Bradford Co. Regional Water Quality Databases - Catskill

WESTON SOLUTIONS The Trusted Integrator for Sustainable Solutions	PROJECT: Hydraulic Fracturing Retrospective Study	PROJECT NO: 14610.011.004
	CLIENT: Chesapeake Energy	DATE: March 22, 2012



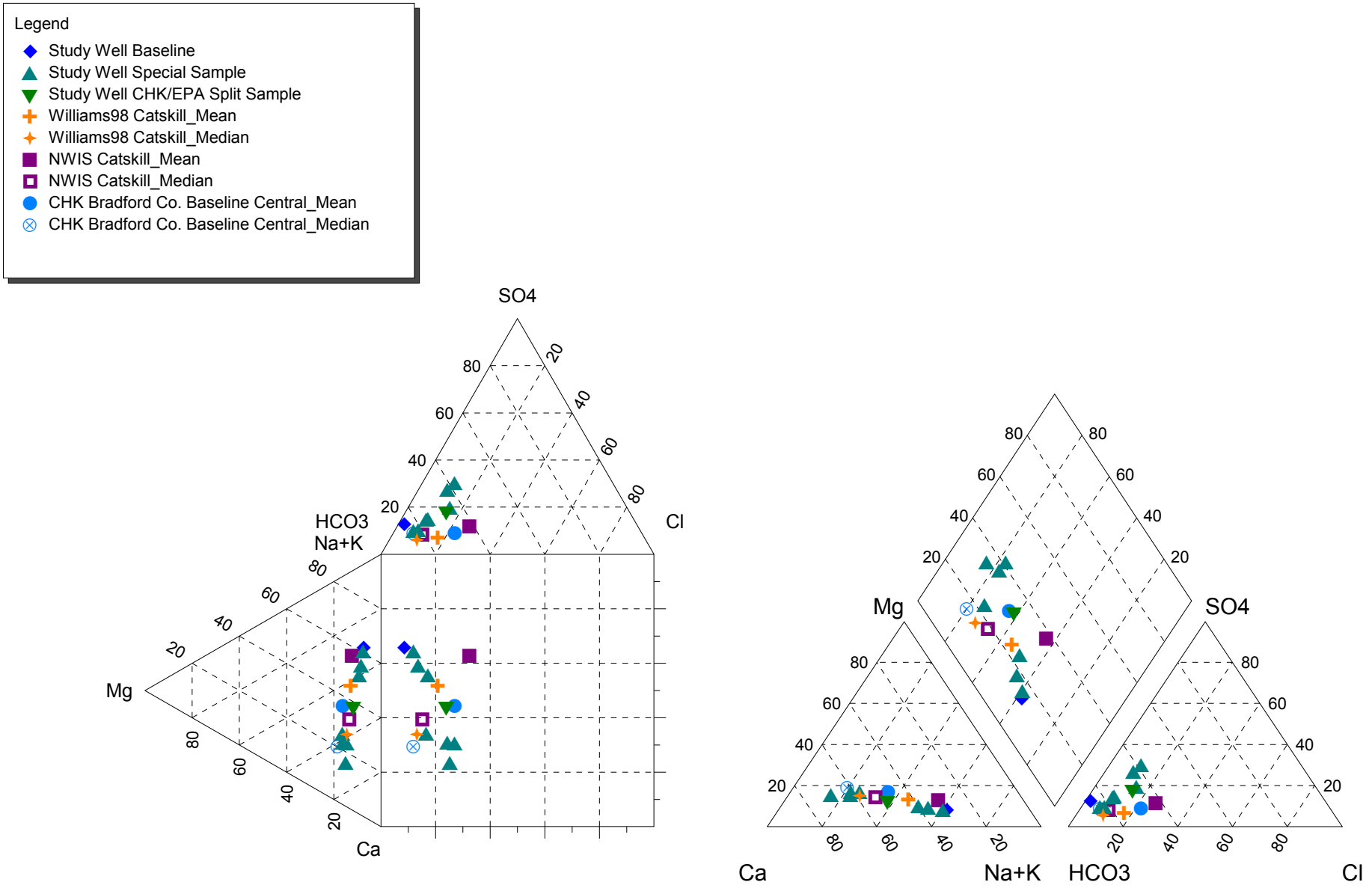
Durov & Piper Diagrams of Property Owner F Well Compared to Means/Medians from Bradford Co. Regional Water Quality Databases - Lock Haven

WESTON SOLUTIONS The Trusted Integrator for Sustainable Solutions	PROJECT: Hydraulic Fracturing Retrospective Study	PROJECT NO: 14610.011.004
	CLIENT: Chesapeake Energy	DATE: March 22, 2012



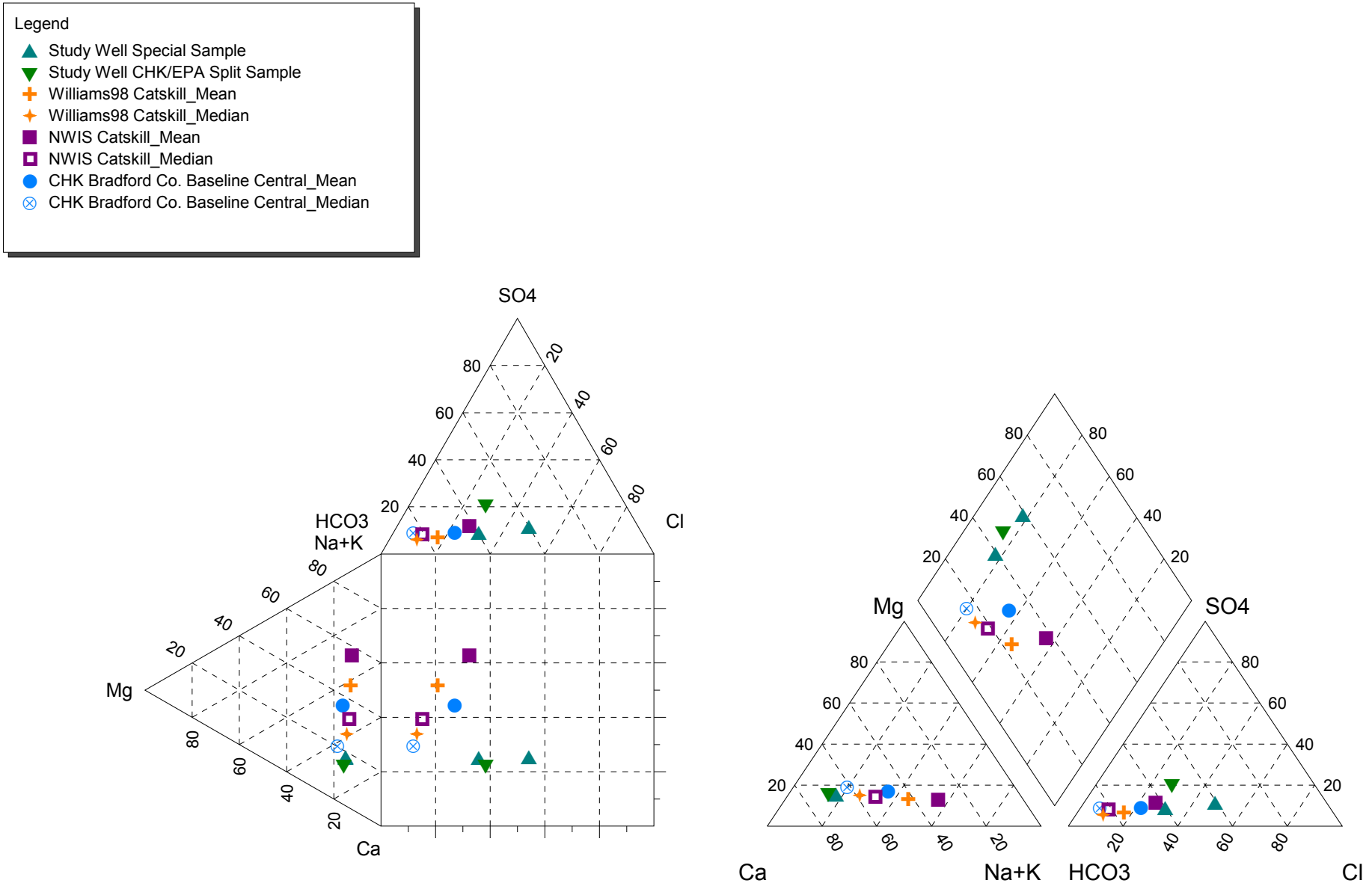
Durov & Piper Diagrams of Property Owner G Well Compared to Means/Medians from Bradford Co. Regional Water Quality Databases - Catskill

WESTON SOLUTIONS The Trusted Integrator for Sustainable Solutions	PROJECT: Hydraulic Fracturing Retrospective Study	PROJECT NO: 14610.011.004
	CLIENT: Chesapeake Energy	DATE: March 22, 2012



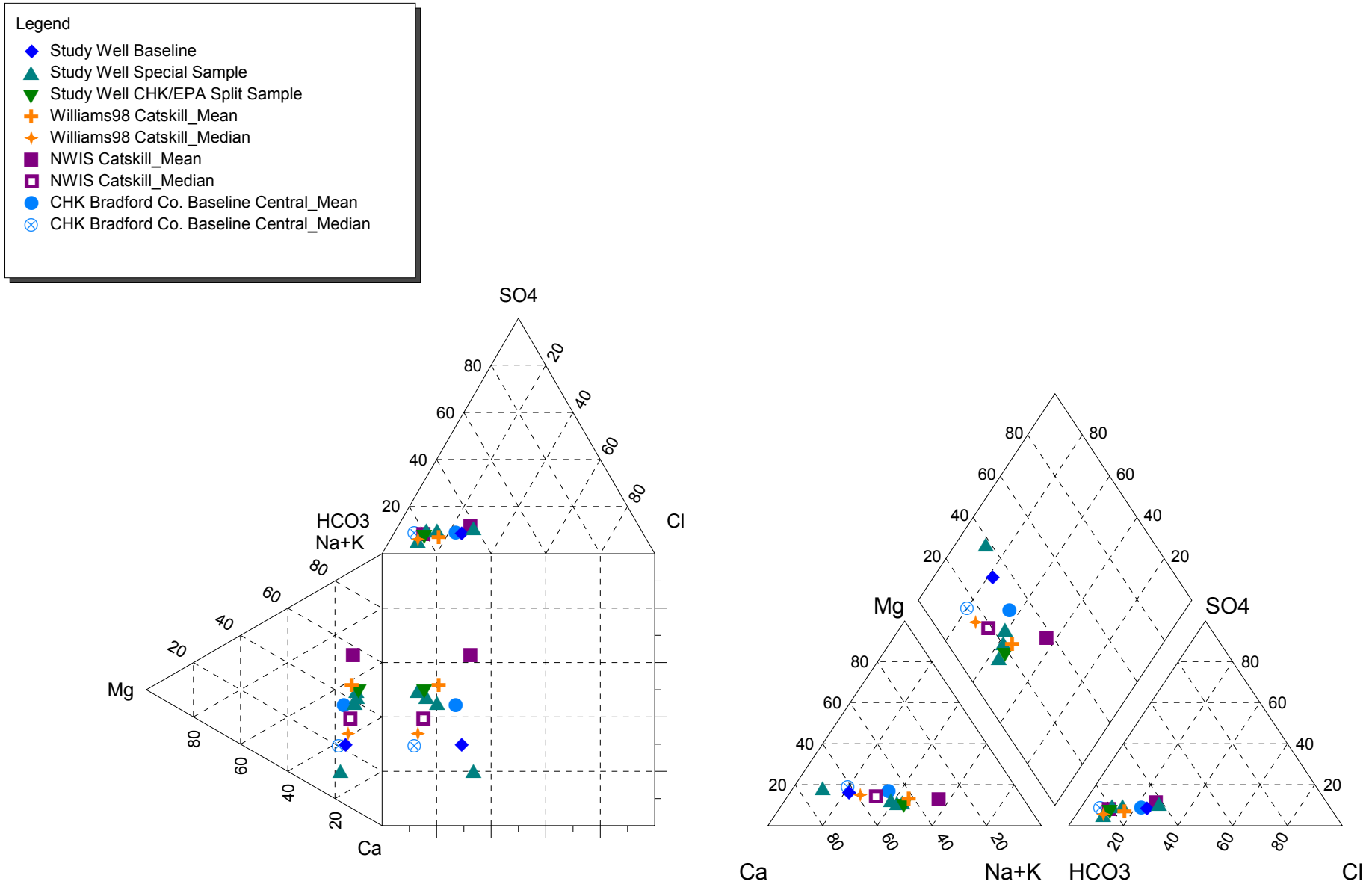
Durov & Piper Diagrams of Property Owner H Well Compared to Means/Medians from Bradford Co. Regional Water Quality Databases - Catskill

WESTON SOLUTIONS The Trusted Integrator for Sustainable Solutions	PROJECT: Hydraulic Fracturing Retrospective Study	PROJECT NO: 14610.011.004
	CLIENT: Chesapeake Energy	DATE: March 22, 2012



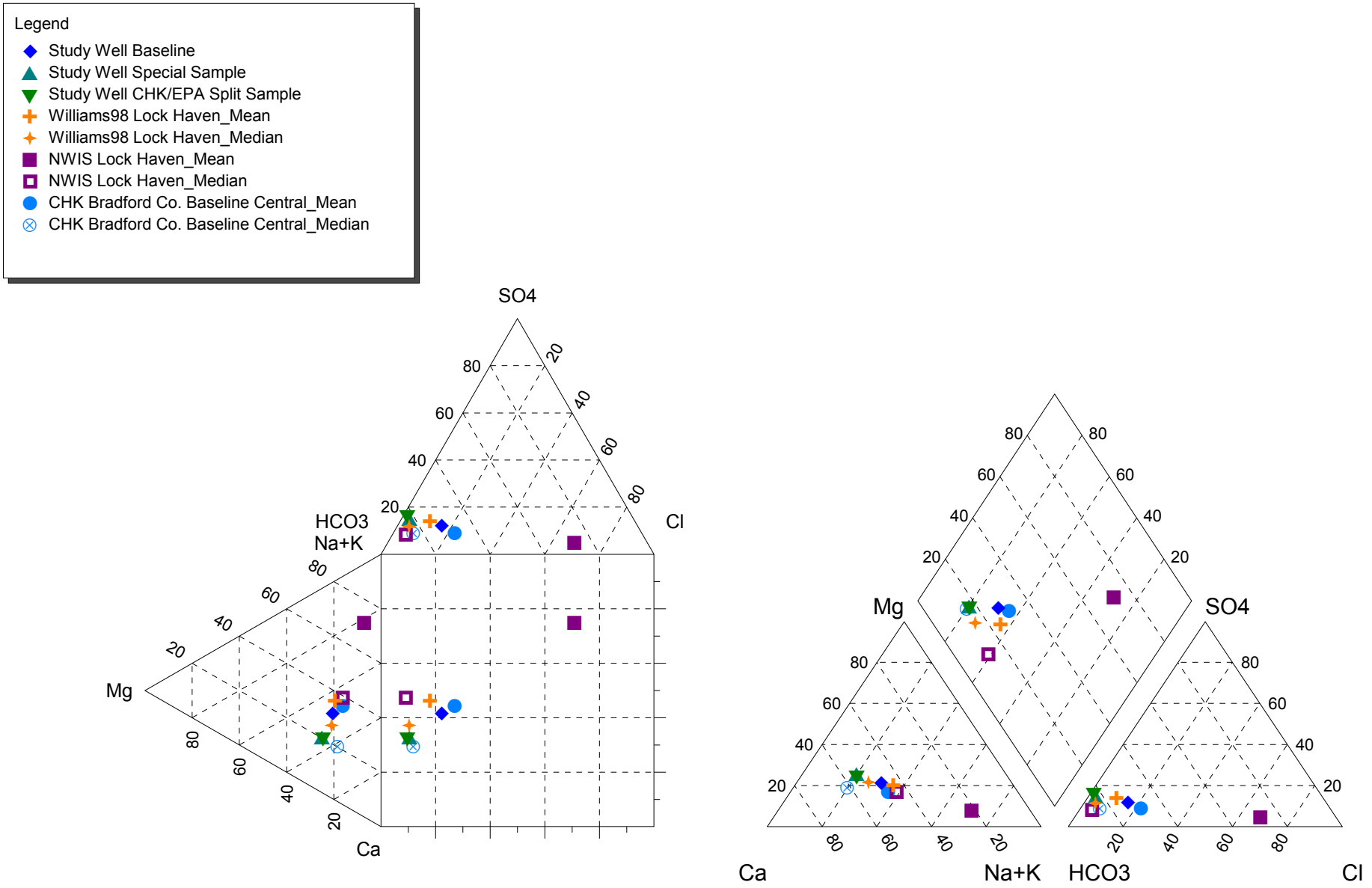
Durov & Piper Diagrams of Property Owner I (142 ft) Well Compared to Means/Medians from Bradford Co. Regional Water Quality Databases - Catskill

WESTON SOLUTIONS The Trusted Integrator for Sustainable Solutions	PROJECT: Hydraulic Fracturing Retrospective Study	PROJECT NO: 14610.011.004
	CLIENT: Chesapeake Energy	DATE: March 22, 2012



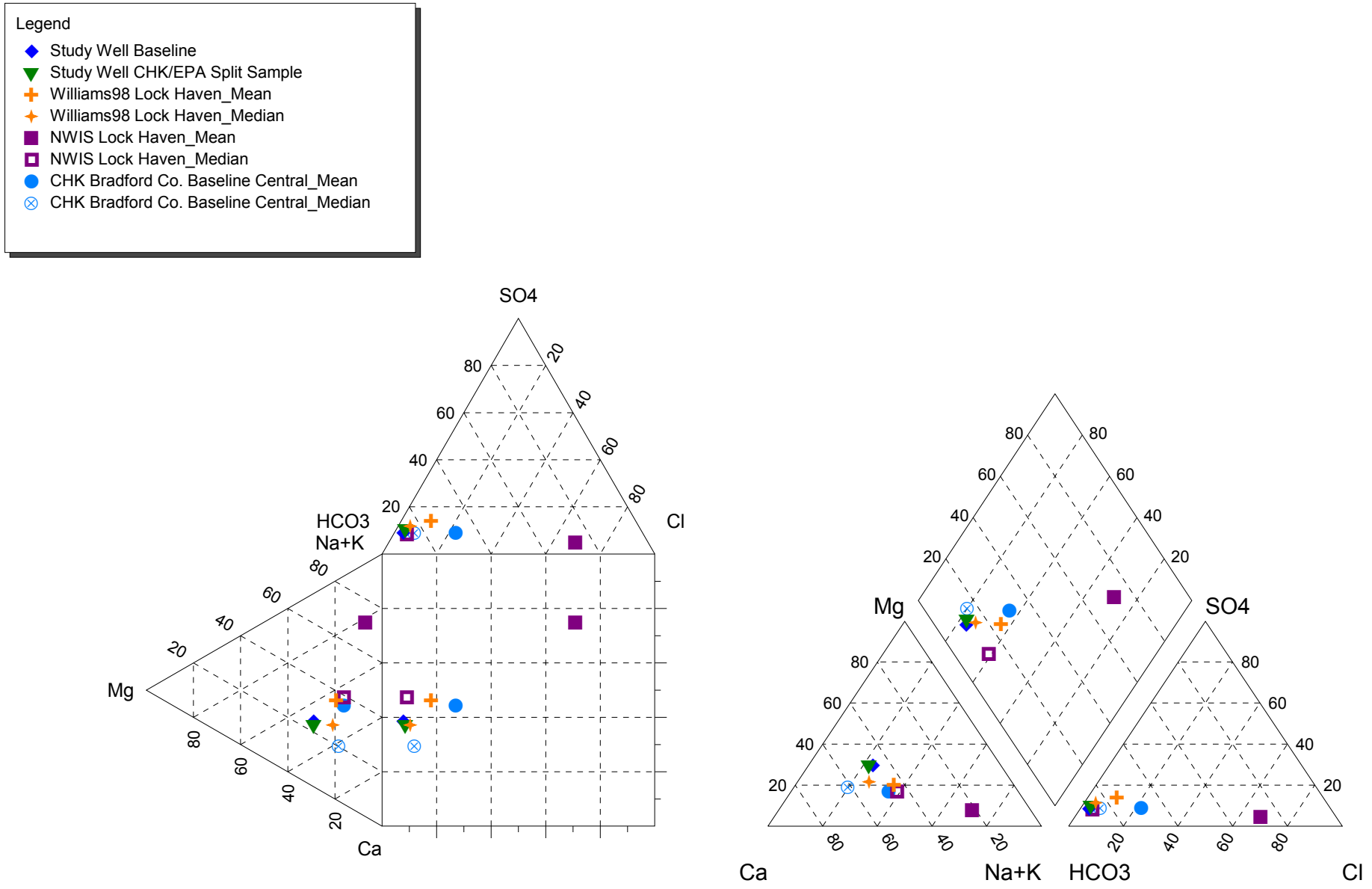
Durov & Piper Diagrams of Property Owner I (203 ft) Well Compared to Means/Medians from Bradford Co. Regional Water Quality Databases - Catskill

WESTON SOLUTIONS The Trusted Integrator for Sustainable Solutions	PROJECT: Hydraulic Fracturing Retrospective Study	PROJECT NO: 14610.011.004
	CLIENT: Chesapeake Energy	DATE: March 22, 2012



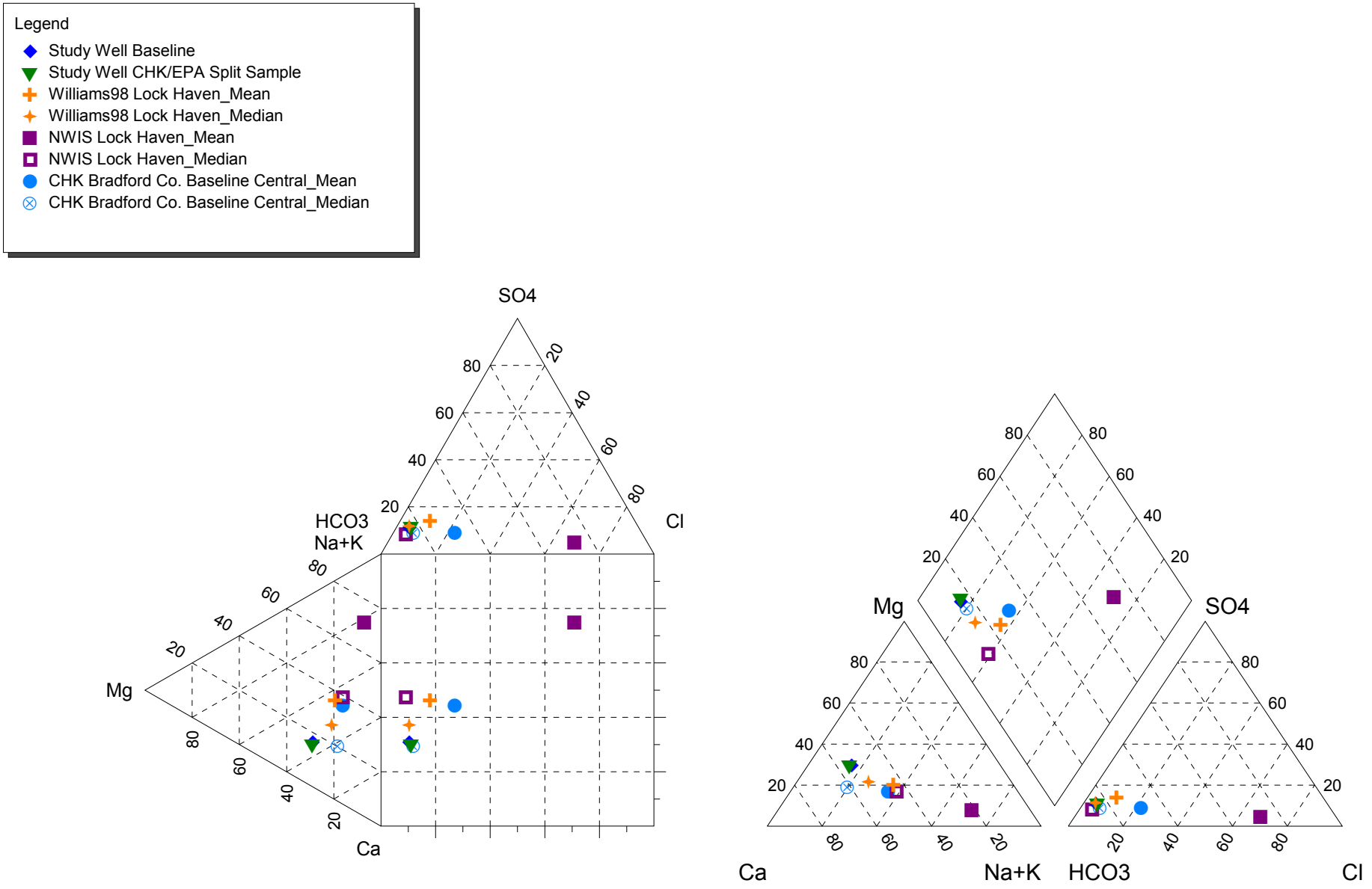
Durov & Piper Diagrams of Property Owner J Well Compared to Means/Medians from Bradford Co. Regional Water Quality Databases - Lock Haven

WESTON SOLUTIONS The Trusted Integrator for Sustainable Solutions	PROJECT: Hydraulic Fracturing Retrospective Study	PROJECT NO: 14610.011.004
	CLIENT: Chesapeake Energy	DATE: March 22, 2012



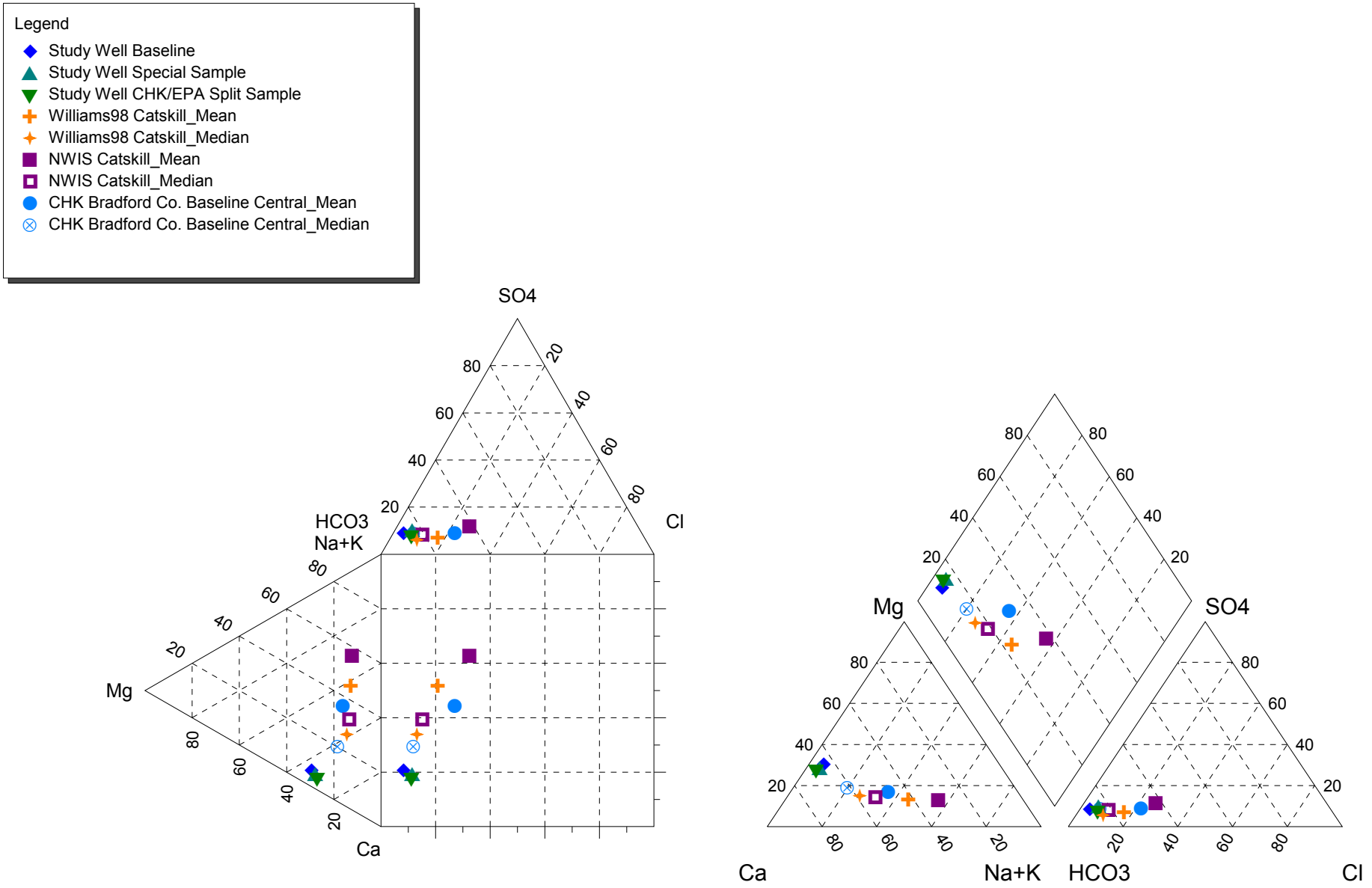
Durov & Piper Diagrams of Property Owner K Well Compared to Means/Medians from Bradford Co. Regional Water Quality Databases - Lock Haven

WESTON SOLUTIONS The Trusted Integrator for Sustainable Solutions	PROJECT: Hydraulic Fracturing Retrospective Study	PROJECT NO: 14610.011.004
	CLIENT: Chesapeake Energy	DATE: March 22, 2012



Durov & Piper Diagrams of Property Owner L Well Compared to Means/Medians from Bradford Co. Regional Water Quality Databases - Lock Haven

WESTON SOLUTIONS The Trusted Integrator for Sustainable Solutions	PROJECT: Hydraulic Fracturing Retrospective Study	PROJECT NO: 14610.011.004
	CLIENT: Chesapeake Energy	DATE: March 22, 2012



Durov & Piper Diagrams of Property Owner M Well Compared to Means/Medians from Bradford Co. Regional Water Quality Databases - Catskill

WESTON SOLUTIONS The Trusted Integrator for Sustainable Solutions	PROJECT: Hydraulic Fracturing Retrospective Study	PROJECT NO: 14610.011.004
	CLIENT: Chesapeake Energy	DATE: March 22, 2012

APPENDIX G
ANALYTE LISTS

ANALYTE LISTS

Parameter	Chesapeake Energy Baseline Parameter List	EPA Retrospective Study Parameter List
Aldehydes		
Gluteraldehyde	---	X
Bacteria		
E. coli	---	X
Fecal coliform bacteria	---	X
Total Coliform Bacteria	---	X
DBCP		
1,2-Dibromo-3-chloropropane	---	X
Extractable Petroleum Hydrocarbons		
Diesel	---	X
General Chemistry		
Alkalinity, Total (CaCO3)	---	X
Ammonia as N	---	X
Bicarbonate Alkalinity as CaCO3	X	X
Bromide	---	X
Carbonate as CaCO3	X	X
Chloride	X	X
CO2 by Headspace	---	X
Cyanide	---	X
Fluoride	---	X
MBAS	X	X
Nitrate	---	X
Nitrate Nitrogen	---	X
Nitrite Nitrogen	---	X
Oil & Grease HEM	X	X
pH	X	X
Phosphorus	---	X
Specific conductance	X	X
Sulfate	X	X
Temperature of pH determination	X	X
Total Dissolved Solids	X	X
Total Suspended Solids	X	X
Turbidity	X	X
Glycols		
1,2-Propylene Glycol	---	X
Diethylene Glycol	---	X
Ethylene Glycol	---	X
Tetraethylene glycol	---	X
Triethylene glycol	---	X
Light Gases		
Acetylene	---	X
Ethane	X	X
Ethene	---	X
Methane	X	X
n-Butane	---	X
Propane	X	X

ANALYTE LISTS

Parameter	Chesapeake Energy Baseline Parameter List	EPA Retrospective Study Parameter List
Low Molecular Weight Acids		
Acetic Acid	---	X
Butyric Acid	---	X
Formic Acid	---	X
Isobutyric acid	---	X
Lactic acid	---	X
Propionic Acid	---	X
Metals, 6020x		
Cesium	---	X
Cesium Dissolved	---	X
Potassium	---	X
Potassium, Dissolved	---	X
Silicon	---	X
Silicon Dissolved	---	X
Thorium	---	X
Thorium, Dissolved	---	X
Uranium	---	X
Uranium, Dissolved	---	X
Metals, Total		
Aluminum	---	X
Antimony	---	X
Arsenic	X	X
Barium	X	X
Beryllium	---	X
Boron	---	X
Cadmium	X	X
Calcium	X	X
Chromium	X	X
Cobalt	---	X
Copper	---	X
Hardness, CaCO3	---	X
Iron	X	X
Lead	X	X
Lithium	---	X
Magnesium	X	X
Manganese	X	X
Mercury	X	X
Molybdenum	---	X
Nickel	---	X
Potassium	X	X
Selenium	X	X
Silver	X	X
Sodium	X	X
Strontium	---	X
Sulfur	X	X
Thallium	---	X
Titanium	---	X
Vanadium	---	X
Zinc	---	X

ANALYTE LISTS

Parameter	Chesapeake Energy Baseline Parameter List	EPA Retrospective Study Parameter List
Metals, Dissolved		
Aluminum, Dissolved	---	X
Antimony, Dissolved	---	X
Arsenic, Dissolved	---	X
Barium, Dissolved	---	X
Beryllium, Dissolved	---	X
Boron, Dissolved	---	X
Cadmium, Dissolved	---	X
Calcium, Dissolved	---	X
Chromium, Dissolved	---	X
Cobalt, Dissolved	---	X
Copper, Dissolved	---	X
Iron, Dissolved	---	X
Lead, Dissolved	---	X
Magnesium, Dissolved	---	X
Manganese, Dissolved	---	X
Mercury, Dissolved	---	X
Molybdenum, Dissolved	---	X
Nickel, Dissolved	---	X
Potassium, Dissolved	---	X
Selenium, Dissolved	---	X
Silver, Dissolved	---	X
Sodium, Dissolved	---	X
Strontium, Dissolved	---	X
Sulfur, Dissolved	---	X
Thallium, Dissolved	---	X
Titanium, Dissolved	---	X
Vanadium, Dissolved	---	X
Zinc, Dissolved	---	X
Miscellaneous Organics		
Inorganic Carbon, Dissolved	---	X
Organic Carbon, Dissolved	---	X
Pesticides and PCBs		
4,4'-DDD	---	X
4,4'-DDE	---	X
4,4'-DDT	---	X
alpha-BHC	---	X
Azinphos-methyl	---	X
beta-BHC	---	X
Carbaryl	---	X
delta-BHC	---	X
Dichlorvos	---	X
Dieldrin	---	X
Disulfoton	---	X
Endosulfan I	---	X
Endosulfan II	---	X
Endosulfan sulfate	---	X
Endrin	---	X
Endrin aldehyde	---	X

ANALYTE LISTS

Parameter	Chesapeake Energy Baseline Parameter List	EPA Retrospective Study Parameter List
Endrin ketone	---	X
gamma-BHC (Lindane)	---	X
Heptachlor	---	X
Heptachlor epoxide	---	X
Malathion	---	X
Methoxychlor	---	X
Mevinphos	---	X
Purgeable Petroleum Hydrocarbons		
GRO as Gasoline	---	X
Semivolatile Organics		
1,2,4,5-Tetrachlorobenzene	---	X
1,2-Dinitrobenzene	---	X
1,2-Diphenylhydrazine	---	X
1,3-Dimethyl adamatane	---	X
1,3-Dinitrobenzene	---	X
1,4-Dinitrobenzene	---	X
1-Chloronaphthalene	---	X
2,3,4,6-Tetrachlorophenol	---	X
2,4,5-Trichlorophenol	---	X
2,4,6-Trichlorophenol	---	X
2,4-Dichlorophenol	---	X
2,4-Dimethylphenol	---	X
2,4-Dinitrophenol	---	X
2,4-Dinitrotoluene	---	X
2,6-Dichlorophenol	---	X
2,6-Dinitrotoluene	---	X
2-Butoxyethanol	---	X
2-Chloronaphthalene	---	X
2-Chlorophenol	---	X
2-Methylnaphthalene	---	X
2-Methylphenol	---	X
2-Nitroaniline	---	X
2-Nitrophenol	---	X
3,3-Dichlorobenzidine	---	X
3-Nitroaniline	---	X
4,4'-Methylenebis(2-chloroaniline)	---	X
4,4'-Methylenebis(N,N-dimethylaniline)	---	X
4,6-Dinitro-2-methylphenol	---	X
4-Bromophenyl phenyl ether	---	X
4-Chloro-3-methylphenol	---	X
4-Chloroaniline	---	X
4-Chlorophenyl phenyl ether	---	X
4-Methylphenol	---	X
4-Nitroaniline	---	X
4-Nitrophenol	---	X
Acenaphthene	---	X
Acenaphthylene	---	X
Acetophenone	---	X
Adamantane	---	X

ANALYTE LISTS

Parameter	Chesapeake Energy Baseline Parameter List	EPA Retrospective Study Parameter List
Aniline	---	X
Anthracene	---	X
Benzo (a) anthracene	---	X
Benzo (a) pyrene	---	X
Benzo (b) fluoranthene	---	X
Benzo (g,h,i) perylene	---	X
Benzo (k) fluoranthene	---	X
Benzoic acid	---	X
Benzyl alcohol	---	X
Bis(2-chloroethoxy)methane	---	X
Bis(2-chloroethyl)ether	---	X
bis(2-Chloroisopropyl)ether	---	X
Bis(2-ethylhexyl)phthalate	---	X
Butyl benzyl phthalate	---	X
Carbazole	---	X
Chlorobenzilate	---	X
Chrysene	---	X
Diallate (cis or trans)	---	X
Dibenz (a,h) anthracene	---	X
Dibenzofuran	---	X
Diethyl phthalate	---	X
Dimethyl phthalate	---	X
Di-n-butyl phthalate	---	X
Di-n-octyl phthalate	---	X
Dinoseb	---	X
Disulfoton	---	X
d-Limonene	---	X
Fluoranthene	---	X
Fluorene	---	X
Hexachlorobenzene	---	X
Hexachlorobutadiene	---	X
Hexachlorocyclopentadiene	---	X
Hexachloroethane	---	X
Indeno (1,2,3-cd) pyrene	---	X
Isophorone	---	X
Naphthalene	---	X
Nitrobenzene	---	X
N-Nitrosodiethylamine	---	X
N-Nitrosodimethylamine	---	X
N-Nitrosodi-n-butylamine	---	X
N-Nitrosodi-n-propylamine	---	X
N-Nitrosodiphenylamine	---	X
N-Nitrosomethylethylamine	---	X
Parathion-ethyl	---	X
Parathion-methyl	---	X
Pentachlorobenzene	---	X
Pentachlorophenol	---	X
Phenanthrene	---	X
Phenol	---	X

ANALYTE LISTS

Parameter	Chesapeake Energy Baseline Parameter List	EPA Retrospective Study Parameter List
Phorate	---	X
Pronamide	---	X
Pyrene	---	X
Pyridine	---	X
Squalene	---	X
Terbufos	---	X
Terpineol	---	X
Tributoxyethyl phosphate	---	X
Trifluralin	---	X
TICs		
1,2,3-Trimethylbenzene	---	X
Volatile Organics		
1,1,1-Trichloroethane	---	X
1,1,2-Trichloroethane	---	X
1,1-Dichloroethane	---	X
1,1-Dichloroethene	---	X
1,2,3-Trimethylbenzene	---	X
1,2,4-Trichlorobenzene	---	X
1,2,4-Trimethylbenzene	---	X
1,2-Dibromo-3-chloropropane	---	X
1,2-Dichlorobenzene	---	X
1,2-Dichloroethane	---	X
1,2-Dichloropropane	---	X
1,3,5-Trimethylbenzene	---	X
1,3-Dichlorobenzene	---	X
1,4-Dichlorobenzene	---	X
Acetone	---	X
Benzene	X	X
Carbon disulfide	---	X
Carbon Tetrachloride	---	X
Chlorobenzene	---	X
Chloroform	---	X
cis-1,2-Dichloroethene	---	X
Diisopropyl Ether	---	X
Ethanol	---	X
Ethyl tert-Butyl Ether	---	X
Ethylbenzene	X	X
Hexachlorobutadiene	---	X
Isopropyl alcohol	---	X
Isopropylbenzene	---	X
m,p-Xylene	---	X
Methoxychlor	---	X
Methyl tert-Butyl Ether	---	X
Methylene Chloride	---	X
Naphthalene	---	X
o-Xylene	---	X
Styrene	---	X
Tert-Amyl Methyl Ether	---	X
Tertiary Butyl Alcohol	---	X

ANALYTE LISTS

Parameter	Chesapeake Energy Baseline Parameter List	EPA Retrospective Study Parameter List
Tetrachloroethene	---	X
Tetrahydrofuran	---	X
Toluene	X	X
trans-1,2-Dichloroethene	---	X
Trichloroethene	---	X
Vinyl chloride	---	X
Xylenes, total	X	X